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CHRISTO ET ECCLESIAE

The Gift of
Henry A. Wise, Esq.
Bureau of Ordnance,
Washington,
10 March, 1864.

140a

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ORDNANCE INSTRUCTIONS

FOR THE

UNITED STATES NAVY.

PART I.

RELATING TO THE

PREPARATION OF VESSLS OF WAR FOR BATTLE,

AND TO THE

DUTIES OF OFFICERS AND OTHERS WHEN AT QUARTERS.

PART II.

THE EQUIPMENT AND MANŒUVRE OF BOATS

AND

EXERCISE OF BOAT HOWITZERS.

PART III.

ORDNANCE AND ORDNANCE STORES.

THIRD EDITION.—PUBLISHED BY ORDER OF THE NAVY DEPARTMENT.

WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1864.

War 4298.64.5

1864. March 16.
Gift of
[illegible]
[illegible] Wise
[illegible] the Bureau of Ordnance.

Officers are requested to communicate to the Bureau of Ordnance any suggestions relative to future additions or corrections, with the reasons for any proposed changes, quoting part, page, and article by its number.

BUREAU OF ORDNANCE,
Navy Department, December 31, 1863.

SIR: The Ordnance Instructions for the Navy have been carefully revised by a board of officers, and such additions and corrections made as the new armaments of vessels of the Navy rendered necessary.

They are approved by the Bureau, and I have the honour to submit them for the adoption of the Navy Department.

I am, sir, with high respect, your obedient servant.

H. A. WISE,
Chief of Bureau, ad interim.

Hon. GIDEON WELLES,
Secretary of the Navy.

NAVY DEPARTMENT,
Washington, December 31, 1863.

SIR: The Revised Ordnance Instructions for the Navy, submitted with your letter of this date, are hereby approved and adopted by the Department, and all officers of the Navy will strictly observe and enforce them.

Very respectfully, &c.,

GIDEON WELLES,
Secretary of the Navy.

Commander H. A. WISE,
Chief of Bureau of Ordnance, ad interim.

INDEX TO THE WORDS,

ALPHABETICALLY ARRANGED.

A.	Part.	Page.	Article.
ACCOUTREMENTS for Captains of Guns, Boarders, and Small-arm men	III	63	250
AIMING, precaution to be observed in	I	85	312
AIR-PORTS to be closed and secured in action or exercise with powder. Duties of Carpenter	I	39	168
ALLOWANCES, ORDNANCE, not specified in tables, to be regulated by special orders from Chief of Bureau (head note)	App. D.		
" – not to be exceeded without authority	III	4	15
" – Tables of	App. D.		
AMMUNITION, allowance of, for target practice	I	4	7
" – not to be exceeded without authority	I	4	7
" – supplies of, not to be reduced below 100 broadsides	I	4	7
" – to be expended at proper intervals	I	4	10
" – for all arms for three years	App. D.		
" – for boat howitzers, boxes for	III	42	165
" – boxes for small arms and fireworks, dimensions and contents of	III	43	170
ANTI-CORROSION	III	70	
ARMAMENT AND EQUIPMENT, defects or deficiencies, to be remedied or reported	I	4	5
" – frequent and thorough examinations and reports to be made of	I	5	15
ARMS, of any description, not to be given away	I	6	19
" – deficiencies to be charged to Gunner	III	5	19
" – description of, to be supplied to boarding parties	II	3	4
" – of boarders	I	21	101
" – of men at the guns	I	21–23	101
" – of men of the Master's division	I	24	101
" – fire, not to be used in the tops without an order from the Captain	I	24	103
" – small, preservation of	III	65	259–261
" – to be cleaned by the men who use them	III	65	261
ARRANGEMENT OF MAGAZINE, &c	III	48	188–206
ASSEMBLING AT QUARTERS, calls for	I	36	154
B.			
BALLS, piling of	III	29–30	104–106
BAYONET scabbards	III	65	258
BATTERIES, to be kept clear, &c	I	6	24
BEDS and QUOINS. See Quoins and Beds.	I–III	89–21	324–70
BLACK STAIN (for wood work)	III	72	
BLOCKS, gun tackle	III	54	212
" – metallic, to be supplied to pivot and Marsilly	III	54	212

	Part.	Page.	Article.
BELTS, waist	III	63	260
BOARDERS, call for assembling	I	37	159
" – selection of	I	18	87–90
" – suggestions in relation to	I	78–80	279–287
" – arms and accoutrements of	I	21–24	101
" – stations of officers	I	18	90
BOATS, armament of	II	4–6	1–5
" – officers of, to see to, and inspect	II	3	2
" – armed for service, manœuvres of	II	23–26	61–70
" – equipments of	II	4–6	1–5
BOAT and FIELD HOWITZERS, exercise of	II	13–21	21–43
" " – notes on the use of	II	21–23	44–60
BOXES, laboratory, for small arms ammunition	III	43	170
BOATSWAIN, duties of, at quarters	I	27	118
BRAINARD'S PAINT	III	73	
BREAST SWEEPS, figured	Plate.	33	
" – useful for carriages of heavy guns	I	54	226
BREECHINGS, size of, material and mode of fitting	III	53	208
" – not to be covered or blacked	III	54	210
" – shifting in action	I	65	263
C.			
CALLS FOR ASSEMBLING AT QUARTERS	I	36	154
CANISTER or CASE SHOT, effective only at short distances	I	83	304
CAP POCKET of pistol frog and musket box	III	64	253
CAPS, percussion, allowance of	App. D.		
CAPTAIN, general duties of, in relation to ordnance	I	3	1–22
" – duties of, at quarters, in battle or exercise	I	25	104–107
" – as soon as the crew has been received on board, will cause the fire bill to be prepared	I	3	2
" – duties of, in case of fire	I	96	358–371
CAPTAINS OF GUNS to be exercised in measuring distances by the eye	I	89	332
" – arms and accoutrements	III	63	250
CARPENTER, general duties of	I	12	56–59
" – duties of, at quarters	I	29–30	130–136
CARPENTER'S MATE and CREW, stations at quarters	I	15	70
CARRIAGES. See Gun Carriages.			
CARTRIDGE BAGS, material and making, &c	III	45	181–182
" – distinguishing colors of	I	9	39
" – spare, allowance to vessels	App. D.		
" – preservation of, from moths, &c	III	47	187
CARTRIDGE BOXES, for small arms	III	64	265
CARTRIDGES, for small arms	III	42	168
" – number allowed	App. D.		
" – compressed for cannon, boxes for	III	41	164
CARTRIDGE PAPER, allowance of	App. D.		
CHANGING SIDES in battle, precautions taken before	I	58	231
CHAPLAIN, station at quarters	I	15	73
CHARGES for great guns, table of	III	39	160
" – for rifled guns	III	40	161
" – how proportioned	III	40	160
" – relative proportion of, to be kept up	I	4	9
" – substitute for, to be used in exercise	I	29	129
" – how distinguished	I	9	39
" – for ordinary firing, to be stowed nearest the scuttle of delivery	I	9	39
" – for saluting	I	10	37

	Part.	Page.	Article.
CHARGES for boat and field howitzers	III	42	165
" – for shells, table of	III	31	108
" – for rifled shells	I	104	378
CHIEF ENGINEER, general duties of, in relation to tools and implements	I	9	35
" – to direct engineer division at quarters	I	27	119
" – duties of, in case of fire	I	98	368
CLERKS, how stationed at quarters	I	76	76
CONE PICKS	III	64	257
COOPERING prohibited in magazines	I	10	44
COMMANDS in exercise of guns on one side	I	47	204
" – in exercise on both sides, alternate guns	I	59	231
" – in exercise on both sides, manning all the guns	I	59	232
" – in quick firing	I	64	261
" – in exercise of pivot guns	I	68	267
" – in exercise of Boarders	I	78-79	281-284
COMPOSITION (Plantou's) for preserving wood and iron	III	71	
CREWS OF SHIPS to be stationed as soon as received on board	I	3	2
" – distribution of, at quarters	I	16	77
" – to be exercised as firemen	I	96	358
CREWS OF GUNS. See "Guns' crews."			
D.			
DARK LANTERNS	III	56	220
DEFICIENCIES to be charged to the Gunner	III	5	19
DISPART	I	87	326
" – how determined	I	87	326
" – sight, when to be employed	I	89	333
DISTANCES OF OBJECTS AT SEA, how determined	I	89	331
" – Officers and Captains of Guns to be exercised in estimating	I	89	332
DISTINCTIONS and **INDULGENCES** for those who excel in gunnery recommended	I	3	2
DISTRIBUTION, GENERAL, of Ship's Company at quarters	I	14-24	64-101
DIVISION, BOXES, their contents and place in action	I	34	150
" – tubs, to be filled before action	I	39	168
" – of guns, by whom commanded	I	14	68
" – Master's	I	15	69
" – Powder	I	15	70
" – of Marines	I	15	71
" – Surgeon's	I	15	72
" – Engineer	I	16	75
DOUBLE SHOTTING, notes on	I	82	299
DRILL, COMPANY and **BATTALION**, recommended	I II	5 27	12 71
DRIFT OF RIFLED PROJECTILES	I	108	399
E.			
EQUIPMENTS and **IMPLEMENTS** at broadside guns	I	32	148
" – at pivot guns	I	66	265
" – of boats armed for service	II	4	5
" – general, defects or deficiencies in, to be ascertained and reported	I	4	5
" – and **STORES**, allowances for, for three years	App. D.		
ENGINEER, CHIEF, general duties of	I	9	35

	Part.	Page.	Article.
ENGINEER, CHIEF, at quarters	I	27	119
EXECUTIVE OFFICER, general duties of	I	6–7	23–28
" -to perform the duties of Gunner in certain cases	I	6	23
" -to inspect Magazines and Shell-rooms, and report when they are ready to receive the ammunition	I	7	28
" -to appoint men in each watch to stow hammocks	I	38	167
" -station in action	I	14	66
" -duties of, at quarters	I	25	108
" -duties of, in case of fire	I	96	360
EXERCISE, of gun and other divisions, until the ship's company is thoroughly instructed in its duties, directed	I	3	2
" -at quarters, preparation for, without powder	I	38	167
" -at quarters, preparation for, as though engaged in battle	I	39	168
" -of the men, at every station, at the guns and by signs	I	57	229
" -must be frequent to secure efficiency	I	58	230
" -of the whole crew in the use of small arms and in the battalion drill	I	5	12
" -of boats' crews in the use of boat and field howitzers	I	5	13
" -general, at night	I	38	167
" -of broadside guns on one side only	I	47–58	204–230
" -general remarks on	I	56–58	229–230
" -changing sides in	I	58	231
" -in quick firing	I	64	261
" -of broadside guns on both sides at once	I	59–60	231–259
" -of pivot guns	I	68–77	268–277
" -of boat and field howitzers	II	13–21	21–43
" -manual, notes on	I	81–95	288–357
F.			
FIGHTING and SECURING guns on one side only	I	47–55	204–228
" " -on both sides at once	I	59–63	231–259
FIRE, ALARM	I	37	163
" -bill to be prepared as soon as the crew is received on board	I	1	2
" -to conform to the arrangements for extinguishing fire at general quarters	I	96	358
" -buckets	III	61	244
" -precaution against, in action	I	12–27	56–119
" -preparations for extinguishing, in action	I	28	123
" -directions in case of	I	96	359
" -alarm of, to be considered a call to quarters	I	96	359
" -false alarm of, followed by exercise	I	98	371
FIRING from guns below spar deck to be kept up in boarding	I	79	282
" -lee lower deck guns, caution in	I	65	262
" -quick, remarks upon	I	64–91	261–343
" -in a sea way, remarks on	I	90	337
" -direct	I	92	344
" -ricochet	I	92	345
" -concentration of	I	93	346
FIREMEN, selection from guns' crews and equipment of, at quarters	I	19	95

	Part.	Page.	Article.
FIREMEN, calls for	I	37	163
FIRE SCREENS described	III	55	214
" – tubs described	III	61	243
" " – one to be placed near the bottom of each shoot for the return of empty passing boxes	I	28	123
FIREWORKS, stowage of	I-III	10–44	42–180
FLASH-PANS, description of	III	56	219
FRICTION MATCHES not allowed to be on board	I	6	22
FULMINATING MATTER, how to be kept and stowed	I	10	42
FUZE WRENCHES described	III	62	246
FUZES to be prepared at the laboratory at Washington	III	31	107
" – damaged, to be returned to laboratory	III	44	179
" – not to be issued after two years in store	III	31	107
" – Commander, to report efficiency in action or exercise	I-III	95–34	354–128
" – Bormann	I	94	357
" – percussion	I-III	107–33	392–125
" – allowance of different times of burning	III	33	123
" – examination and trial of	I	5	16
" – not to be shifted or shortened without an order from the Captain	I	5	17
" – how to shorten	I	94	350
" – condition of, to be frequently examined	I-III	5–31	16–113
" – precautions to be observed in removing, and in screwing in	III	32	116
" – of 10 and 15 seconds, when to be substituted for the fuze of 5 seconds	III	33	126

G.

	Part.	Page.	Article.
GAUGES for spherical shot and shell	III	27–28	100
" – for rifled shot and shell	I	54	379
GRAPE SHOT, effective distance for using	I	83	302
" – use of, with solid shot, not to be encouraged	I	83	303
" – allowance to vessels	App. D.		
GRAPNELS, for boats, described	III	56	221
GRIOLET, for dismounting guns, described	III	54	213
" – manner of using	I	101	375
GUNNER, general duties of	I	9–12	36–55
" – station of, in action	I	15	70
" – duties to be performed by Executive Officer in small vessels	I	6	25
GUNNER'S MATE, during the absence or illness of the Gunner, to perform his duties	I	12	54
" – station in action	I	17	82
GUNS, nomenclature of the parts of	I	46	202–203
" – divided into *shot* and *shell*	III	20	60
" – charges for. Table	III	39–40	160–161
" – care, stowage, and preservation of, at navy yards	III	20	57–62
" – not to be cut or chiselled	III	21	66
" – not to be condemned without survey	III	21	67
" – examination of, before mounting on board ship	III	21	68–71
" – examination of, at the end of cruise	III	22	73
" – how prepared for transportation or for striking below	III	21	72
" – getting in, on covered decks	I	100	372
" – taking in, over all	I	101	373
" – getting out, through ports and over all	I	101	374
" – mounting and dismounting	I	101	375
" – how numbered and divisioned on board ship	I	14	67
" – how manned, table of numbers	I	16	78

	Part.	Page.	Article.
GUNS, to be kept dry with their implements	I	11	48
" - not to be dismounted or struck below unless necessity requires it	I	6	18
" - broadside, stations and numbers at	I	35	152
" - broadside, casting loose, providing and securing at quarters	I	40–48	169–206
" - throwing overboard	I	103	376
" - lower deck, housing	I	55	228
" - permanent and shifting men at, how distinguished	I	60	235
" - pivot, stations and numbers at	I	67	266
" - casting loose and providing	I	68	268
" - of every kind to be either discharged or their shot drawn in case of fire	I	96	359
" - of every kind to be unloaded before entering port	I	6	21
" - pivot and shifting, each to have ful crews	I	17	80
GUN CARRIAGES, to be frequently examined and cleaned	I	8	32
" - nomenclature and construction of	I	46	202
" - iron work of, to be examined and kept in order	I	8	32
" - connecting bolts of, to be tightened	I	8	32
GUN LOCKS and SIGHTS, to be properly fitted and marked	I	87	324
GUN GEAR	III	53	208
" - tackles, falls, and blocks for, material and size	III	54	211
" - slings	III	57	224
GUNS' CREWS, table of	I	16	78
" - selection of men for	I	17	79
" - titles, gun numbers, and arms of	I	21	101
GUNPOWDER, stowage and preservation of	III	34	131
" - tests of, in case it has not been regularly inspected and proved	III	38	152
" - precautions to be observed in receiving or landing	III	38	157–159
" - each lot of, to be recorded and a ticket attached to it	III	36	140
" - gravimetric density of, to be ascertained before filling cartridges	III	43	173
" - for saluting may be purchased abroad	III	38	153
" - transfer of, to other vessels homeward bound	III	38	154
" - reports of, to be made to the bureau, and samples forwarded to Washington for testing	III	38	152
" - initial velocity required	III	34	131
" - size of grain	III	34	132
" - See POWDER for other details			
H.			
HAMMOCKS, arrangements for stowage of, at night, *note*	I	38	167
" - arrangements for stowage of, in case of fire	I	97	363
HANDSPIKES, ordinary	III	60	238
" - roller	III	60	238
HARNESS CASKS for boats	III	62	249
HATCHWAYS, which to be covered in action	I	32	142
" - to be reserved for lowering the wounded	I	45	201
HOUSING GUNS	I	55	228
HOWITZERS, exercise of	II	13	21
" - used in boarding and repelling boarders	I	79	285

	Part.	Page.	Article.
I.			
IMPLEMENTS, spare, for divisions to be got ready	I	38	167
" – and equipments, miscellaneous	III	57	53–62
IMPRESSION TAKER for vents	III	61	239
" – wax, for vents	III	74	
INCLINED PLANES, for elevation and depression	I	90	335
INSPECTION of shot and shell	III	25–28	83–103
" – of guns	III	6–9	25–42
INSTRUMENTS used in the inspection of guns, descriptive list of	III	10–19	56
L.			
LACQUERS, for iron ordnance	III	69–70	271
" – for bright iron work	III	71	
" – for small arms, threads of screws, and waterproof paper	III	71	
" – how to thin, when too stiff	III	32	117
" – allowance of, to vessels	App. D.		
LADLES for drawing projectiles	III	60	235
LANDING seamen and marines	II	27–29	71–89
LANTERNS, dark	III	56	220
" – battle	App. D.		
LINE OF METAL, objections to aiming by	I	87	326
LOADING in one motion	I	64	262
LOCK STRING, men to be exercised in pulling	I	85	309
M.			
MAGAZINES of ships to be inspected before taking powder on board	I	7	28
" – construction, lighting, and flooding of	III	48	188
" – moisture in, how ascertained	III	52	205
" – moisture in, how absorbed	III	36	142
MAGAZINE, dresses described	III	55	216
" – implements, allowance of, to vessels	App. D.		
" – keys to be kept by the Captain	I	6	20
" – keys, by and to whom delivered on going to quarters	I	6	20
" – passages connected with, to be kept clear	I	7	24
" – precautions in opening and closing	I	11	50
MAGAZINE, how to be stowed	III	52	201
" – plan to be furnished	III	52	201
" – arrangements for delivering and distributing powder	I	41–44	180–199
MARINES, division of, by whom commanded	I	15	71
" – to act as a covering party to pikemen and boarders	I	80	286
MARKING GUNS	III	10	52
MARSILLY CARRIAGE, plate of, and nomenclature of parts	Plate.	46	
MASTER, division of, and station in action	I	15	69
" – general duties of, relating to preparation for action, drill, &c	I	26	111
" – duties of, at quarters, in battle, and exercise	I	26	110
" – duties of, in case of fire	I	98	368
MASTER-AT-ARMS, duties of, at quarters	I	30	137
MAST BANDS for fishing spars	III	62	248
MATCHES, FRICTION, not to be allowed on board ship	I	6	22
MIDSHIPMEN, aids to the captain	I	14	66
" – how stationed at quarters	I	16	76
MUZZLE LASHING for housing guns	III	61	245

	Part.	Page.	Article.
N.			
NOMENCLATURE of the parts of naval guns	Plate.	46	
" – of naval truck carriages	I	46	202
" – of Marsilly carriages	Plate.	46	
" – of Van Brunt's friction carriage	I	46	203
O.			
OFFICERS, stations of, at quarters	I	14	64
" – in charge of divisions, general duties of.	I	8–9	29–35
" – duties of, at quarters	I	25–34	114–151
" – commanding divisions of guns, duties of	I	31	140–147
" – duties of, in case of fire	I	97	364
" – of divisions, to be practiced in estimating distances	I	89	332
ORDNANCE, OFFICERS, (Inspectors,) duties of, in navy yards, (see chap. 1, part III, at large)	III	3–6	1–24
" – equipments and stores, receipt, care, and expenditure of	III	2–7	1–21
" – equipments, to be examined and landed in proper condition at the expiration of the cruise	I	5	18–19
" – allowances, tables of	App. D.		
" – allowance of, not to be exceeded without authority	III	4	15
" – naval, nomenclature of	I	46	
" – ledger to be signed by proper officers before leaving station	III	5	20
P.			
PACKING BOXES, ammunition, and metal cases, to be preserved and turned into store	I–III	10–57	43–223
PAINTS and **LACQUERS**	III	63	241
PASSING BOXES described	III	61	271
" – to have charges for ordinary firing kept in them in time of war	I	9	38
" – how distinguished	I–III	44–61	196–24
" – during action or exercise with powder, not to go inside the magazine screen.	I	29	128
PATCH, leaden, over the fuze, to be removed before firing.	I	82	293
PERCUSSION CAPS, for small arms, to be kept in boxes and stowed separately—*not to be put in the magazine*	I–III	10–44	41–180
" – for small arms, to be supplied from the Laboratory at Washington	III	44	180
" – for small arms, how put up and packed	III	43	170
" – for small arms, number allowed to vessels	App. D.		
" – for small arms, boxes in which packed, how labelled	III	44	180
PETTY OFFICERS, distribution of, at quarters	I	17	81
PIKE, for the use of port guard, to be kept near guns	I	19	90
PIKEMEN, selection of	I	19	91
" – call for	I	37	160
" – where to assemble when called	I	37	165
" – how armed at quarters	I	19	92
" – position of, in repelling boarders	I	19	94
PISTOL FROG	III	63	253
PIVOT GUNS, to be placed under special charge of a suitable officer	I	14	68

	Part.	Page.	Article.
PIVOT GUNS, equipments and implements of	I	66	265
“ – crews to be taken half from each watch	I	17	79
“ – stations and gun numbers of crew	I	67	266
“ – exercise for, words of command	I	68	267
“ – transporting	I	77	278
POINTING GUNS, notes on	I	85–90	310–335
PORT GUARDS, duty of, in battle or exercise	I	79	284
POWDER. See GUNPOWDER also.			
“ – loose, not to be taken on board ship	I	10	40
“ – damaged, to be returned to the United States to re-worked	III	38	151
“ – belonging to officers, to be stowed in the magazine	I	10	40
“ – arrangements for delivering and distributing	I	41	180
“ – barrels, hoops and heads of, to be started before entering the magazine	I	10	44
“ – division, by whom commanded	I	15	70
“ – division, duties of officers in command of	I	28	120
‘ – division, hatches of deck next above, to be covered in action	I	29	130
POWDER HOUSES, inspection of, by ordnance officers	III	35	135
“ – to be opened and aired in clear weather	III	36	141
POWDERMAN to be allowed to XI, X, and IX-inch guns	I	17	78
POWDER MEASURES, standard	III	43	173
POWDER SCUTTLES, very careful men to be selected for the care of	I	18	85
POWDER TANKS, how stowed and marked	I–III	10–40	39–160
“ – not to be opened without special order	I	11	57
“ – lids of, not to be unscrewed in battle until orders are given by proper authority	I	29	127
“ – capacity of, for filled cylinders	III	41	163
PRACTICE, TARGET, forms for reports of	App. C.		
“ – allowances for, not to be exceeded, &c			
PRIMERS FOR CANNON, description and stowage of	III	43	174
“ “ – allowance of, to vessels	App. D.		
“ “ – *on no account to be kept in*	I	4	7
the magazine	III	44	177
“ “ – men to be exercised in the use of	III	44	176
“ “ – friction, described	III	44	176
“ “ – friction, use of	III	44	176
“ “ – percussion, precaution in the use of	I	84	306
PRIMER BOXES described	III	63	252
PROJECTILES, care and preservation of, in navy yards	III	24	77
“ “ – on board ship	I	5	15
“ – number and kind of, allowed to vessels	App. D.		
“ – dimensions and weight of	III	27	100
“ – piling of	III	29	104–106
PUMPMEN, selection of, from guns' crews	I	20	99
“ – division of	I	20	100
PAYMASTER, station and duties of, at quarters	I	16	74
PAYMASTER'S CLERK	I	16	76

Q.

	Part.	Page.	Article.
QUARTERS, calls for assembling at	I	36	154
“ – manner of assembling at	I	30	135
“ – assembling at, in the night	I	3	3
“ – duties of officers at	I	25–34	104–151

INDEX TO THE WORDS,

ALPHABETICALLY ARRANGED.

A.	Part.	Page.	Article.
ACCOUTREMENTS for Captains of Guns, Boarders, and Small-arm men	III	63	250
AIMING, precaution to be observed in	I	85	312
AIR-PORTS to be closed and secured in action or exercise with powder. Duties of Carpenter	I	39	168
ALLOWANCES, ORDNANCE, not specified in tables, to be regulated by special orders from Chief of Bureau (head note)	App. D.		
" – not to be exceeded without authority	III	4	15
" – Tables of	App. D.		
AMMUNITION, allowance of, for target practice	I	4	7
" – not to be exceeded without authority	I	4	7
" – supplies of, not to be reduced below 100 broadsides	I	4	7
" – to be expended at proper intervals	I	4	10
" – for all arms for three years	App. D.		
" – for boat howitzers, boxes for	III	42	165
" – boxes for small arms and fireworks, dimensions and contents of	III	43	170
ANTI-CORROSION	III	70	
ARMAMENT AND EQUIPMENT, defects or deficiencies, to be remedied or reported	I	4	5
" – frequent and thorough examinations and reports to be made of	I	5	15
ARMS, of any description, not to be given away	I	6	19
" – deficiencies to be charged to Gunner	III	5	19
" – description of, to be supplied to boarding parties	II	3	4
" – of boarders	I	21	101
" – of men at the guns	I	21-23	101
" – of men of the Master's division	I	24	101
" – fire, not to be used in the tops without an order from the Captain	I	24	103
" – small, preservation of	III	65	259-261
" – to be cleaned by the men who use them	III	65	261
ARRANGEMENT OF MAGAZINE, &c	III	48	188-206
ASSEMBLING AT QUARTERS, calls for	I	36	154
B.			
BALLS, piling of	III	29-30	104-106
BAYONET scabbards	III	65	258
BATTERIES, to be kept clear, &c	I	6	24
BEDS and **QUOINS**. See Quoins and Beds.	I-III	89-21	324-70
BLACK STAIN (for wood work)	III	72	
BLOCKS, gun tackle	III	54	212
" – metallic, to be supplied to pivot and Marsilly	III	54	212

	Part.	Page.	Article.
BELTS, waist	III	63	260
BOARDERS, call for assembling	I	37	139
" – selection of	I	18	87–90
" – suggestions in relation to	I	78–80	279–287
" – arms and accoutrements of	I	21–24	101
" – stations of officers	I	18	90
BOATS, armament of	II	4–6	1–5
" – officers of, to see to, and inspect	II	3	2
" – armed for service, manœuvres of	II	23–26	61–70
" – equipments of	II	4–6	1–5
BOAT and FIELD HOWITZERS, exercise of	II	13–21	21–43
" " – notes on the use of	II	21–23	44–60
BOXES, laboratory, for small arms ammunition	III	43	170
BOATSWAIN, duties of, at quarters	I	27	118
BRAINARD'S PAINT	III	73	
BREAST SWEEPS, figured	Plate.	33	
" – useful for carriages of heavy guns	I	54	226
BREECHINGS, size of, material and mode of fitting	III	53	208
" – not to be covered or blacked	III	54	210
" – shifting in action	I	65	253

C.

	Part.	Page.	Article.
CALLS FOR ASSEMBLING AT QUARTERS	I	36	154
CANISTER or **CASE SHOT**, effective only at short distances	I	8	34
CAP POCKET of pistol frog and musket box	III	64	263
CAPS, percussion, allowance of	App. D.		
CAPTAIN, general duties of, in relation to ordnance	I	3	1–2
" – duties of, at quarters, in battle or exercise	I	25	104–106
" – as soon as the crew has been received on board, will cause the fire bill to be prepared	I	3	2
" – duties of, in case of fire	I	96	[illegible]
CAPTAINS OF GUNS to be exercised in measuring distances by the eye	I	[illegible]	322
" – arms and accoutrements	III	63	260
CARPENTER, general duties of	I	12	[illegible]
" – duties of, at quarters	I	29–31	121–126
CARPENTER'S MATE and **CREW**, stations at quarters	I	15	71
CARRIAGES. See Gun Carriages.			
CARTRIDGE BAGS, material and making, &c	III	45	181–182
" – distinguishing colors of	I	9	[illegible]
" – spare, allowance to vessels	App. D.		
" – preservation of, from moths, &c	III	46	[illegible]
CARTRIDGE BOXES for small arms	III	64	265
CARTRIDGES for small arms	III	42	168
" – number allowed	App. D.		
" – compressed, for cannon, boxes for	III	41	164
CARTRIDGE PAPER, allowance of	App. D.		
CHANGING SIDES in action, precautions taken before	I	58	221
CHAPLAIN, station at quarters	I	15	73
CHARGES for great guns, table of	III	[illegible]	[illegible]
" – for rifled guns	III	40	[illegible]
" – how composed	III	[illegible]	[illegible]
" – fixed proportion of, to be kept up	I	4	3
" – [illegible] to be used in exercise	I	[illegible]	[illegible]
" – how distinguished	I	[illegible]	[illegible]
" – for ordinary firing to be stowed nearest the scuttle of [illegible]	I	4	[illegible]
" – for saluting	I	[illegible]	[illegible]

	Part.	Page.	Article.
CHARGES for boat and field howitzers	III	42	165
" – for shells, table of	III	31	108
" – for rifled shells	I	104	378
CHIEF ENGINEER, general duties of, in relation to tools and implements	I	9	35
" – to direct engineer division at quarters	I	27	119
" – duties of, in case of fire	I	98	368
CLERKS, how stationed at quarters	I	76	76
CONE PICKS	III	64	257
COOPERING prohibited in magazines	I	10	44
COMMANDS in exercise of guns on one side	I	47	204
" – in exercise on both sides, alternate guns	I	59	231
" – in exercise on both sides, manning all the guns	I	59	232
" – in quick firing	I	64	261
" – in exercise of pivot guns	I	68	267
" – in exercise of Boarders	I	78–79	281–284
COMPOSITION (Plantou's) for preserving wood and iron	III	71	
CREWS OF SHIPS to be stationed as soon as received on board	I	3	2
" – distribution of, at quarters	I	16	77
" – to be exercised as firemen	I	96	358
CREWS OF GUNS. See "Guns' crews."			
D.			
DARK LANTERNS	III	56	220
DEFICIENCIES to be charged to the Gunner	III	5	19
DISPART	I	87	326
" – how determined	I	87	328
" – sight, when to be employed	I	89	333
DISTANCES OF OBJECTS AT SEA, how determined	I	89	331
" – Officers and Captains of Guns to be exercised in estimating	I	89	332
DISTINCTIONS and **INDULGENCES** for those who excel in gunnery recommended	I	3	2
DISTRIBUTION, GENERAL, of Ship's Company at quarters	I	14–24	64–101
DIVISION, BOXES, their contents and place in action	I	34	150
" – tubs, to be filled before action	I	39	168
" – of guns, by whom commanded	I	14	68
" – Master's	I	15	69
" – Powder	I	15	70
" – of Marines	I	15	71
" – Surgeon's	I	15	72
" – Engineer	I	16	75
DOUBLE SHOTTING, notes on	I	82	299
DRILL. COMPANY and **BATTALION**, recommended.	I II	5 27	12 71
DRIFT OF RIFLED PROJECTILES	I	108	399
E.			
EQUIPMENTS and **IMPLEMENTS** at broadside guns	I	32	148
" – at pivot guns	I	66	265
" – of boats armed for service	II	4	5
" – general, defects or deficiencies in, to be ascertained and reported	I	4	5
" – and **STORES**, allowances for, for three years	App. D.		
ENGINEER, CHIEF, general duties of	I	9	35

CHAPTER I.

GENERAL DUTIES

OF OFFICERS IN RELATION TO ORDNANCE AND GUNNERY, AND TO MILITARY EQUIPMENTS AND EXERCISES.

CAPTAIN.

1. The Captain or Commanding Officer will be careful to require that all the ordnance instructions are strictly enforced on board the vessel under his command; and although particular duties are assigned, and various instructions given to the other officers of the vessel, yet he is to see that the duties are performed, and the instructions obeyed, by the officers to whom they are respectively addressed.

2. As soon as the crew is received on board the vessel, he shall cause a fire-bill to be prepared, the crews shown their stations, and see that it is duly stationed at quarters for battle, (*See articles* 78 *to* 103,) and exercised at general quarters, and by divisions, particularly the powder division, (*See articles* 180 *to* 201,) until each officer and man is thoroughly instructed in his duties; after which the exercises are to be frequent during the cruise. Exercises which are short and spirited are preferable to those which are long and fatiguing. Distinctions and indulgences to those who excel are recommended.

When the men have become well acquainted with their duties at the guns *and in passing powder*, or when the general duties of the ship are unusually fatiguing, the divisional exercises may be confined to those belonging to one watch. It is directed that, unless bad weather prevent, Monday of each week be set apart for general quarters.

3. He will, *at least once* in two months for the first year of the cruise, and once in three months for the remainder thereof, assemble the crew at quarters in the night, without any previous intimation of his intention to do so, and have a general exercise. He will inspect the ship throughout, and cause an entry to be made in the log book of the length of time required between the *beginning* of the call to quarters and the complete preparation for commencing action; also when every gun is ready for a second fire.

4. In order to ascertain whether the equipments are complete and their uses understood, as soon after the ship has been commissioned as circumstances will permit, he will cause at least one round to be fired, with shot or shells, according to the nature of the gun; and, when practicable, at targets at known distances and with the appropriate service charges. (*See article* 489.)

5. He will immediately endeavor to discover whether defects or deficiencies in the armament or equipment exist, and, if any be found, will remedy them as far as in his power consistently with instructions, representing them to the Commandant of the yard of outfit, if near it; and, if important, to the Chief of the Bureau of Ordnance.

6. On the representation of the Gunner that the Ordnance Stores are injured or liable to injury he will order the survey called for by Article 49.

7. He will, in each quarter of the first year of the cruise, expend in target-practice six rounds, and in each succeeding quarter-year six broadsides, making the report as required by Art. 14.

He will not, however, either for this purpose or for saluting, reduce his supply of ammunition below 100 broadsides.

8. In order to accustom the men to the use of loaded shells, they are frequently to be used in preference to shot. For this purpose, however, empty shells, or those that are "bouched" only, will be carefully fitted, filled, and fused on board, in season, according to the directions, (*Chap.* 1 *Part ii.*) and first expended.

9 The relative proportions of "distant," "ordinary," and "near-firing" charges are to be preserved (*See article* 159 *Part iii.*) as nearly as practicable, and after action or exercise, deficiencies caused by the expenditure of any particular kind of charge will be made up, without unnecessary delay, from the others on hand.

10. The allowances for target-practice are not to be expended in one or two exercises, but are to be divided in such proportions as to allow target-practice once a fortnight, or at least once a month, when practicable; and at least three-fourths of the charges allowed shall be expended in practice at sea, when it can be conveniently done, opportunities being chosen for that purpose under all the circumstances of wind and weather in which vessels of war are liable to engage in battle.

11. When in port, and circumstances will admit, such places are to be selected for practice as are favorable for the recovery of the projectiles; when the effect of the bursting charge is not important, a blowing charge

may be used in shells, to test the efficiency of the fuze without destroying the shell.

In *practice* the service charges for which the sights are marked are alone to be employed.

Distances within half a mile are preferable for *solid shot*, as best showing the result. Targets of ten feet high by twenty long will afford the means of general comparison, and with the practice at the experimental battery at Washington particularly. For *shells* the distances should suit the ranges of their fuzes, or time of burning, that the degree of certainty of explosion in direct or ricochet fire may be seen and noted.

12. The whole crew are to be exercised in the use of the musket, carbine, pistol and sword, and in firing at a target with small arms, by suitable persons, each division under the superintendence of its respective commanding officer. The company and the battalion drill is recommended as often as convenient opportunities of exercise present themselves.

13. He will cause the boats' crews to be exercised in all the preparations for attacking an enemy, either by land or water, and in the use of "boat and field howitzers," and small arms, under all the various circumstances likely to arise in such service, and particularly in embarking and disembarking the "boat and field" guns and ammunition. (*See Part* II.)

14. At the expiration of each quarter he will cause to be prepared, and forward, by the earliest favorable opportunity, to the Bureau of Ordnance, a report of all firing, with or without projectiles, according to the detail given in form C, Appendix; also the quarterly return of receipts and expenditure in the Ordnance Department.

15. He will, once in every quarter, cause a thorough examination to be made into the condition of the armament, shot and shells; and will see that care is taken to keep the shot and shell lockers dry; that the shot and shells stowed therein are clean and free from rust, and, also, that the diameter of shot kept on deck is not increased above the high gauge by injudicious lacquering or painting, and report to Bureau that this has been done.

16. He is to take care that especial attention is paid to the fuzes, whether spare or in the shell; and if there be reason to suspect injury from dampness or any other cause, he will have one or more fuzes burned for trial.

17. He will not permit shells to be filled, or their fuzes to be shifted or shortened, without his order; and whenever these operations are to be performed, he will see that a suitable and properly secured place is selected for the purpose. On such occasions, the fires and lights are to be extin-

guished, and also the further precautions are to be observed, as to the manner of performing the work, contained in the directions for filling and emptying shells. (*See Part iii. chap.* 1.)

18. He is not to dismount, strike below, or otherwise render unfit for immediate use, any of the guns on board the ship he commands, except imperative necessity should require it for the safety of the vessel. The particular circumstances of such necessity are to be immediately entered at large in the log, and information is to be given to the Commander of the squadron, and to the Secretary of the Navy.

When guns are to be struck below, or when shipped for transportation, he shall cause all the precautions to be taken to guard them from injury, prescribed in article 46 of these instructions, and such others as circumstances require.

19. He is prohibited from giving away the arms of any description belonging to the vessels under his command.

20. He will keep the keys of the magazines and shell rooms, and of the receptacles for percussion caps and primers, and of the cocks for flooding magazines and shell rooms, in the cabin, where they may be obtained by the Executive Officer in case they should be wanted when the Captain is absent from the vessel, and they are only to be delivered to the Executive Officer, or the Officer of the Powder Division.

21. Before entering any friendly port, he will cause every gun to be drawn and reloaded with cartridge, if necessary to salute.

22. He will not permit friction-matches to be on board under any circumstances, and before sailing will notify all persons of this regulation and institute a search to see that it has been complied with.

EXECUTIVE OFFICER.

23. The Executive Officer will, under the orders and direction of the Captain, ascertain that all the ordnance stores and equipments ordered or allowed for the vessel are received on board in good order; that they are properly distributed and stowed; that they are only used or expended according to directions from proper authority, and that they are duly accounted for according to the directions and forms which are or may be prescribed by the Bureau of Ordnance. In small vessels which have no Gunner, he shall receipt for and be accountable for all ordnance stores, making all the returns which the Gunner is herein directed to prepare.

24. He will be particularly attentive to the state of the batteries, small

arms, magazines, shell rooms, and shot lockers; to the passages leading to and scuttles connected with them, and take care that they are kept clear and ready for action.

25. He will cause convenient places to be assigned for the stowage of spare articles which may be required in action, and see that shot for at least twenty broadsides for shot guns, and one shell for each shell gun, are always in readiness upon the respective decks.

26. When salutes are to be fired he is personally to examine or to direct one of the Officers Commanding a Division to examine and ascertain, and report that the necessary preparations are made and precautions taken to avoid accidents. The guns, if loaded, are to be drawn, wormed, sponged, and reloaded. They are, *nevertheless*, to be so laid as to prevent the possibility of mischief, even in the contingency of a shot or wad being left in any of them. Hard wads are not to be used in firing salutes, nor are portfires. The guns are to be fired either with percussion or friction primers, as the Captain may prefer. These, when in good order, are not apt to fail if the lock-string be properly pulled; as, however, a slight deterioration may interfere with the regularity of salutes, the precaution of dropping a few grains of gunpowder into the vent will be found effectual.

Guns of the lowest calibre and class, when sufficient in number, are to be used for saluting; and no heavier than their *near-firing* charge is to be used. (*See article* 159, *Part iii.*) *Two boats' howitzers* will be found sufficient for saluting. "Saluting powder" to be used in all guns for this purpose, in preference to "service powder."

27. In large vessels he will cause a cot with a spare sacking-bottom, or such other apparatus as may be approved by the Surgeon, to be prepared and kept for the purpose of lowering the wounded to the orlop or berth deck.

28. Before the powder is received on board, he, with the Gunner, will carefully inspect the magazines and shell rooms, their passages and light rooms, and have them thoroughly cleaned, dried, and aired, and will see that the pipes and stop-cocks, and everything connected with flooding the magazines, are in order, acquaint himself with their position and mode of operation; the lighting apparatus cleaned and dried, and particularly that the glasses for transmitting light into the magazines and shell rooms are clear and without fracture; that the light burns clearly, and the box well ventilated, and shall report to the Ordnance Officer when the magazines are ready to receive the ammunition. (*See Chap.* i, *Part* III.)

OFFICERS IN CHARGE OF DIVISIONS.

29. OFFICERS IN CHARGE OF DIVISIONS OF GUNS are required to make themselves thoroughly conversant with every particular relating to the equipment, exercise, and management of the guns, as set forth in these instructions, and especially to familiarize themselves with the charges prescribed and the ranges given in the tables; the principles and practice of pointing guns under all circumstances, and also with every precaution connected with the use of shells, and of percussion and time fuses.

30. They are carefully to inspect their divisions when called to quarters for inspection or exercise, and see that everything is, *at all times*, in place, and in order for service, and in case of discovering any defect or deficiency will report it to the Executive Officer.

31. They will be careful, when instructing the men at quarters, to require a strict adherence to the prescribed mode of performing their duties, and to all the details of execution, in order that general uniformity and the efficiency dependent on it may be secured. When the individuals of the guns' crews have become expert in the performance of their particular duties, then each man shall be instructed, by the officer of his division, until he shall have become acquainted with the special duties of every station at the gun. (*See Chapter* iv, *article* 229.)

32. They are at least once a week to examine the guns and all the iron work of the carriages, and see that they are kept free from rust, and especially the eccentric axles, elevating screws, and pivot bolts, which must be protected by a mixture of tallow and white-lead or other similar coating. The cap-squares must be frequently removed, the guns lifted, and the trunnions cleaned; the elevating screws oiled, but never cleaned with brick or emery paper.

Once a quarter *at least* all the connecting bolts, such as cap-square, bracket, breast, and transom bolts, are to be examined and tightened if they require it. To do this it is necessary, after lifting the gun, to turn the carriage bottom up. The threads of the screws of the bolts above named must be coated with the "lacker for small arms."

33. THE OFFICER OF THE POWDER DIVISION will, in like manner, carefully instruct and drill his men, and test the efficiency of the arrangements for passing powder, shot, and shell, in order to insure a full and equal supply of each to all parts of the batteries, without the danger of misdirection or of accumulations in any part thereof. To this end blocks of proper shapes

and colors may be provided in the appropriate tanks of the magazines, and passed up instead of powder, when that is not used. These are to be counted and reported by the Officers of the Gun Division, and will enable the Executive Officer, and the Officers of the Powder Division, to detect and remedy defects or deficiencies in the system or its details, and to be sure that the men are properly stationed and instructed.

MASTER.

34. The MASTER will see that the number of fighting-stoppers, whips for preventer-stays, preventer-braces, slings for yards and gaffs, relieving-tackles, and other articles in his division, which are directed, are all fitted and ready for use in action. At general quarters his division must be regularly drilled in fishing masts and spars, stoppering and knotting rigging, trimming sails, &c.

CHIEF ENGINEER.

35. The CHIEF ENGINEER will ascertain that all the tools and implements necessary for the prompt and effectual repair of injuries, which the engine and its dependencies may receive in action, are received on board and placed at hand.

GUNNER.

36. He shall attend personally at the ordnance store, where his stores shall be delivered to him, the Ordnance Officer furnishing him with means of transportation and men for stowing them in their appointed places on board ship. He is to be especially careful that the equipments and stores belonging to the magazine are arranged therein in conformity to Ordnance Instructions.

37. The powder tanks containing charges for each class of guns are to be stowed on their sides, with their lids next the alleys, and hinges down. near the magazine scuttles through which these charges are to be delivered; the charges for "*ordinary firing*" nearest the scuttle. When tanks are emptied they are to be stowed on the upper shelves, that the powder may be kept, as much as possible, below the water line.

38. In time of war, passing-boxes are to have charges for "*ordinary firing*" kept in them ready for passing up at once.

39. It is the intention in future to use white alone for all cylinders; the calibre and weight to be distinctly stencilled on each bag. Until this is

accomplished, or in case of a deficiency of white cartridge cloth, the different charges for all classes of guns may be distinguished by the color of the cartridge bags; *white* being used for distant firing, *blue* for "ordinary" firing, and *red* for "near" firing.

The lid ends of the powder tanks for service charges are to be painted of the same colors as the cartridge bags which they contain, and are also to be distinctly marked with the calibre and weight of the gun for which the cartridges are intended. Tanks for musket powder must be marked MUSKET POWDER; and this powder may be put up in either of the kind of charges allowed which will make the best stowage, and in bags of the color used to distinguish such charges.

Tanks containing *saluting* powder are to be marked "SALUTING." It is to be kept in *red* or "*near firing*" bags.

40. No loose powder is ever to be taken or carried on board ship, and all, whether public or private, belonging to officers, must be safely stowed in the magazines.

41. All percussion caps and percussion or friction primers, or other articles containing fulminating matter, must be kept in boxes prepared for the purpose, and the boxes must be stowed separately from other articles, in a dry, secure and safe place, under lock and key, and are on no account to be put in the magazine. It is recommended that they be distributed in two or three places, a portion conveniently at hand.

42. The fireworks, after *carefully removing all fulminating matter, such as caps or primers*, if any such be used to ignite them, are to be stowed in their proper packing boxes on the racks in the passages of the magazines; but a supply for immediate use is to be kept in some convenient place.

43. All ammunition packing boxes, shell-bags, and metal cases are to be preserved and returned into store at the end of the cruise.

44. No coopering is ever to be done in the magazines of ships. Should powder be received on board in barrels, the hoops and heads must be started on the orlop or berth deck before entering the magazine.

45. In stowing shell rooms, filled shells are to be stowed together in boxes or bags, those having fuzes of different times of burning, and each kind of fuze will be placed in tiers or ranges distinctly separate. (*See art.* 347, *etc. on fuzes*, C. *iv.*) Empty shells are to be stowed by themselves, unsabotted, in bulk, in a dry place.

46. Whenever he is directed to strike guns below, or prepare them for transportation, he will see the bore washed with fresh water, carefully sponged, thoroughly dried, and coated with melted tallow, and a wad dipped in the same material inserted, and connected with a tompion by a laniard. He is to see that the tompion is put in securely, and the vent and all screw holes stopped by a plug of soft wood, and puttied over.

47. He is to examine and report daily, before 10 a. m. and 8 p. m., whether the guns and all their equipments; the whips for supplying shot and shells; the arm chests, armory, and small arms; the supply and reserve division boxes, and other articles furnished as ordnance and ordnance stores, are in good order and in place, and make immediate report to the Commanding or Executive Officer of any defects or deficiencies which he may discover at any other time.

48. The guns and their equipments are to be kept as dry as possible, and no salt water used in cleaning them.

49. If he shall discover any articles to be injured, or liable to injury from any cause, he will ask, in writing, for a survey to be held to determine the amount, cause, or liability of any of the stores or equipments to damage or deterioration, a copy of this request and report of survey to be furnished to him as a voucher, by the officer ordering the survey.

50. Whenever the magazines or shell rooms are opened, he is to take every precaution to guard against accident by fire; to examine particularly that all the men stationed in any way in or about the magazine, embracing all stationed within the magazine screen, put on the magazine dress and shoes, and on no account have anything metallic about them, and that no improper articles are introduced. He will also see that all the articles required for sweeping and removing loose powder are at hand, and that those operations are performed before the magazine is closed.

51. The tanks are never to be opened unless by special order, or when powder is actually required for service, and then no more of the lids are to be unscrewed than is necessary for immediate supply. The strictest attention to this regulation is required of the Gunner, as experience has proved that the preservation of the powder in good condition depends upon the entire exclusion of damp air.

52. When the guns are ordered to be drawn before entering into a friendly port, the Gunner is to be particularly attentive to assure himself that no shot or wad is left in any gun.

53. In saluting he is to guard against accident in loading, pointing and firing, and to be particularly careful in *reloading*, where that operation is unavoidable.

54. In the absence or illness of the Gunner, his general duties will devolve on a Gunner's Mate.

55. The Gunner shall keep a minute book of all expenditures in the Ordnance Department, and on Monday of each week shall submit it to the Executive Officer for examination and approval. Within ten days after the expiration of the quarter he shall make out his quarterly return in the required form, which shall be signed by him, certified correct by the Executive Officer, approved by the Commander, and forwarded to the Bureau by the first opportunity. At the same time the ledger shall be posted. When a vessel returns from a cruise to be refitted or repaired or placed in ordinary, the Gunner is not to leave the ship, unless specially authorized by the Secretary of the Navy, until all the guns, powder, small arms, ammunition, and other articles under his charge, shall have been examined and surveyed, and turned over to his successor, or other person appointed to receive them, or to the Inspector of Ordnance, the receipt for which he shall show to the officer to whom he applies for leave.

CARPENTER.

56. The CARPENTER shall ascertain and report to the Executive Officer that there are a sufficient number of tarpaulins to cover all the hatches leading to the fore and after orlops; that the pump-gear of every description is ready and in order for rigging the pumps, and that every preparation can be promptly made before going into action to free the ship, in case of receiving injuries below the water line.

57. He is also to examine and keep in order the force and channel pumps, the fire engine, the division tubs, and, in short, all the apparatus necessary to give a good and speedy supply of water in case of fire in action.

58. He is specially charged with the care and distribution of articles for stopping shot holes or repairing other injuries to the hull, which may be received in action, viz: shot-plugs and mauls; pieces of pine board from eighteen inches to three feet long, and from twelve to fifteen inches wide, covered with felt or fearnaught, previously coated with tar or white lead; patches of sheet lead, all with nail holes punched; and trowser-slings for lowering men outside the vessel, to be provided with a pouch or pocket to contain a hammer and nails. Tarred canvas or oakum should be prepared to shove into the shot holes before the patches of board or lead are nailed on. Although shot-plugs are still to be allowed, the means just described are most to be relied on.

59. In case it shall not have already been done, the Carpenter, under the direction of the Commander or Executive Officer of the ship, will draw a black line two inches broad on the ceiling of the ship to correspond with the ordinary height of the water line. On this is to be marked, by corresponding intervals and numbers, the position of the ports on the lowest of the gun decks. By this arrangement the position of the shot-hole can be easily ascertained and communicated, through the Officer Commanding the Powder Division, and a remedy promptly applied. To this end he is to pay habitual attention to keeping the wings clear to four feet below the water line, and report any obstructions to the Executive Officer

YEOMAN.

60. The Yeoman is to charge himself with, and is to be accountable for, all articles of ordnance stores which may be placed in the storeroom under his charge, and is not to issue or expend any article, except by order of, or authority from, the Captain or Executive Officer.

61. On the return of a ship to be laid up at a yard, or to be refitted or repaired, the Yeoman will be retained to deliver the ordnance stores in his charge into the hands of the Ordnance Officer, or Navy Storekeeper of the yard if there be no Ordnance Officer. And if these stores be found in good order, and to correspond with the books of invoice and expenditure, it shall be the duty of the Commandant of the yard, if the ship is to be laid up, to give him a certificate to that effect; but if a deficiency in the stores under his charge be discovered, or that they are in bad order, the Ordnance Officer will report the same to the Commandant of the yard, who will order a survey to ascertain the nature and extent of the deficiency, or injury, and whether either were caused by the Yeoman's negligence or fault.

62. Should the Commandant of the yard be satisfied that the alleged injuries or deficiencies proceed neither from culpable neglect nor dishonesty on the part of the Yeoman, the Commandant may direct the wages due the Yeoman to be paid him, and that he be discharged with a certificate of good conduct, provided the Commander of the vessel assent thereto; but if the Commandant shall find just cause for suspecting fraud or negligence, he shall suspend the payment and discharge of the Yeoman until he shall report the case to the Bureau and receive the orders of the Department.

63. No person is to be knowingly *appointed* Yeoman who has already served in that capacity, in any vessel of war of the United States, and cannot produce a satisfactory certificate of his former good conduct as Yeoman.

CHAPTER II.

GENERAL DISTRIBUTION OF OFFICERS AND MEN AT QUARTERS.

64. The following directions for the general distribution of a ship's company at quarters, or for action, are intended to secure, upon the most important points, a degree of uniformity which will promote efficiency, and at the same time leave to the Captains the selection and arrangement of many individuals under their command, according to their own views of the particular qualifications of each.

65. The CAPTAIN'S station, in action, is upon the quarter deck.

66. The Executive Officer; the Midshipmen acting as *aids* to the Captain; and the Signal Officer, are also to be stationed on the quarter deck.

67. The stations of the other Officers are to be regulated by divisions, as follows:

The guns upon each deck are to be numbered from *forward,* beginning with No. 1, and continuing aft in succession, each gun and its opposite being designated by the same number, excepting pivot and shifting guns, each of which is to have a separate number. The guns on each deck are then to be divided as equally as possible into three or two divisions, according to the number of Lieutenants or other Watch Officers on board, so that each division of guns and the persons belonging to it may be commanded by a Lieutenant or other Watch Officer. These divisions are to be numbered consecutively, designating the forward division on the lowest gun deck as the first division, and passing from the after division of one deck to the forward division of the next deck above it.

68. The command of these divisions of guns is to be assigned, in the order of their numbers, to the Lieutenants or other Watch Officers, according to their rank, assigning the first division to the officer next in rank to the Executive Officer. In case of a deficiency of Watch Officers, the quarter deck division may be assigned to an Ensign or Midshipman, who will act under the general supervision of the Executive Officer. When the

number of officers on board of vessels having pivot guns will permit, each pivot gun will be placed under the special charge of a suitable officer of the division of which it forms a part.

MASTER'S DIVISION.

69. This division will comprise all those stationed in the tops, and those appointed to attend to the rigging, sails, steerage and signals. The Master is to be stationed on the quarter deck, and to be assisted by the Boatswain, whose station will be on the forecastle. The Boatswain will be charged with all his divisional duties in the event of his death or absence. (*For arms, see table in article* 101.)

POWDER DIVISION.

70. This division will be under the direction either of a Lieutenant, Master, Ensign, or competent Midshipman. It will consist of all those stationed below the gun decks, except persons belonging to the Surgeon's Division and the Paymaster and his Clerk.

The Gunner is to be stationed in the main magazine, and a Gunner's Mate or Quarter Gunner in the other magazine, when there are two; and those persons of this division who may be stationed in the magazines and passages are to be under the immediate direction of the Gunner and his Mate, respectively. Those of the Carpenter's crew stationed in the hold or wings are to be under the immediate direction of the Carpenter's Mate, who will be stationed with them. All reports, however, are to be made through the Commanding Officer of the division.

DIVISION OF MARINES.

71. All the Marines who may not be distributed to other divisions for action are to compose a Division of Marines, to be under the immediate command of the Superior or Senior Officer of Marines on board. He will form his division on such part or parts of the spar or upper deck as the Captain may direct.

SURGEON'S DIVISION.

72. The SURGEON or senior Medical Officer will have the direction of this division, which shall comprise all the Medical Officers and such other persons as may be designated by the Captain to assist in the care of the wounded in action. This division will occupy the cockpit or such other convenient place as the Captain of the vessel may direct.

THE CHAPLAIN.

73. The CHAPLAIN will be in attendance to perform the duties of his sacred office, and to render such other service as may be in his power.

PAYMASTER.

74. The PAYMASTER's station will be in the ward room and on the berth deck, in charge of the money, books, and stores belonging to his Department.

ENGINEER DIVISION.

75. The Engineer Division shall be under the direction of the Chief Engineer, and shall comprise the Assistant Engineers and such of the Firemen and Coalheavers as may be detailed for the purpose. An Assistant will be appointed to take charge of the fire party detailed from this Division.

76. Ensigns, Midshipmen, Master's Mates, Captain's and other Clerks, the Sailmaker, and other officers not enumerated, are to be assigned to the different divisions at the discretion of the Captain.

77. In distributing the Petty Officers, Seamen and others to the guns and other stations in the several divisions, it is desirable, as a general rule, that those stationed at the same gun or near each other at quarters, should be drawn from different stations for working ship; so that a great loss at any one gun may not fall too heavily on any watch station.

Exceptions to this general rule may be advantageously made where the duties of men require their habitual attendance on particular decks. In such cases it will generally be advisable to station them at quarters near to the places of their ordinary duties.

78. Table showing the number of men for the service of each kind and class of gun in use in the Navy, assuming the vessel to have the established complement.

Pivot guns.					BROADSIDE GUNS.						
					Shell guns.			Shot guns.			
XI-inch of 16,000 lbs., 150-pdr. rifle.	X-inch of 12,000 lbs.	IX-inch of 9,000 lbs., 64-pdr. of 106 cwt., 100-pdr. rifle.	30-pdr. rifle.	20 pdr. rifle.	IX-inch of 9,000 lbs.	VIII-inch of 63 cwt.	VIII-inch of 56 cwt.	32-pdr. of 57 cwt.	32-pdr. of 42 cwt.	32-pdr. of 33 cwt.	32-pdr. of 27 cwt.
24	20	16	10	8	16	14	12	12	10	8	6

To the XI, X, and IX-inch, 150-pounder and 100-pounder rifle, and 64-pounder pivot guns, a Powderman, and to all other guns a Powderboy is to be added.

The number of men to form crews of guns mounted on carriages of special character, is to be regulated as may be found most advantageous by the Commanding Officer.

79. In designating the Petty Officers and others for particular stations, it is assumed that the intelligence, skill, and force of the men have been equally divided between the two watches, and that the men in the starboard watch have all odd numbers, as 1, 3, 5, &c., and those of the port watch even numbers, as 2, 4, 6, &c.

To preserve this equality and to secure the ability of those who may be upon deck to prepare the ship for action at night, whilst the watch below are bringing up and stowing the hammocks, all the *odd* numbered guns will be *entirely manned* by men belonging to the starboard watch, and all the *even* numbered guns by those belonging to the port watch, as far as practicable. The crews of pivot guns to be taken half from each watch.

80. Where ports on opposite sides of the same deck are numbered the same, and are both provided with a gun, gun's crews are only to be furnished for the guns on one side. Pivot and shifting guns are each to have full gun's crews.

81. When the complements allowed to vessels of the Navy will permit, it is recommended as a general arrangement that the gun's crews be formed of about one-third Petty Officers and Seamen, one-third Ordinary Seamen, and one-third Landsmen and Boys, and that this system be observed as nearly as practicable.

82. At least one Quarter Gunner should be stationed at each division of guns; and a Gunner's Mate or Quarter Gunner in the smaller magazine, and in each shell room.

If there be more shell rooms than there are disposable Quarter Gunners to attend them, other careful and suitable persons are to be selected to supply the deficiency.

83. Forms of Quarter Bills for different classes of vessels, arranged upon this plan and with reference to stations in watches, and to arrangements for passing powder, are placed in the Appendix.

Though it is not proposed to require an exclusive adherence to these forms, yet their adoption, where practicable, and the application of the same principle to all vessels, is strongly recommended, that as near an approach to uniformity may be secured as circumstances will permit.

84. Before permanently assigning the individuals which form a gun's crew, to the performance of particular duties connected with its service in action, it is important to ascertain their respective qualifications, as far as may be practicable, by questioning them or by exercising them at the guns.

The Captains, especially, should be selected from those in whose skill, coolness, and judgment the greatest reliance can be placed, without regard to their ratings, though at the same time care should be taken to avoid stationing men of a higher rating than the Captains of the guns, to perform subordinate duties at the same guns. They should be examined by the Surgeon with reference to eyesight.

Spongers and Loaders rank next in importance, and with activity and coolness should possess the necessary physical strength and stature. For Handspikemen, weight is important in addition to strength and coolness.

85. Very careful men should be selected for attending the Powder-scuttles on the different decks, as well to prevent noise and contention among the Powderboys as to guard against accidents and speedily to repair such as may occur. The boys should be trained to fall into line to insure an equal distribution of powder.

86. Unless some special reason should require a different arrangement with regard to Boarders, Pikemen, Firemen, Sailtrimmers, and Pumpmen, the following will be observed:

BOARDERS.

87. Half the men composing a gun's crew (excluding the Powderman or Boy) are to be Boarders. When this rule gives an odd number of men, the odd one is to be a Second Boarder.

88. The Boarders are to constitute two divisions, called First and Second Boarders.

89. First Boarders are, generally, to be taken from the second part of a gun's crew; and Second Boarders from the first part.

90. All Petty Officers on the spar deck, except the Quartermaster at the conn and the Quartermaster at the wheel, are to be First Boarders.—(*For arms of Boarders, see Table, article* 101.)

The Executive Officer leads the Boarders. All the Division Officers on the spar deck shall be First Boarders, except the officer commanding the quarter-deck division, who shall lead the Pikemen. On gun-decks the officer commanding the second division shall be a First Boarder; the commanding officers of the other divisions shall be Second Boarders. If there are two officers in any division, the second shall lead those Boarders which do not go with his principal. A Lieutenant or other responsible officer should be detailed to command the gun-deck in the absence of the boarders and pikemen.

PIKEMEN.

91. One-fourth of the number of men composing a gun's crew, (rejecting fractions, and excepting the Powderman or Boy,) and all the men of the Master's division on the spar deck, except those designated as Boarders and those at the wheel and conn, are to be Pikemen, and are to compose but one division.

92. For each Pikeman at a gun there is to be a musket provided, which in action, when not in use, is to be kept with the bayonet unfixed, hooked securely against a carline or beam near the gun; or in case of a spar deck conveniently at hand. When they are called away they will repair on deck with these muskets, when, if ordered to do so, they will place them in a secure place, to be designated by the Executive Officer, and arm themselves with pikes. Pikemen will wear a musket cartridge-box whenever at general quarters or in action.

Pikemen of the spar deck divisions will, on being called away, arm themselves as directed.

Should it become necessary, *in an emergency*, to call "*all hands*" from below to repel an enemy, the Pikemen will, if not already so armed, arm themselves with these muskets, leaving their pikes to be used by those whose arms are not designated—that is, by the remainder of the gun's crew and Powder division.

93. One boarding pike for each gun on covered decks is always to be kept triced up conveniently near it, and this is to be used by the Powderman, or any other person left at the gun to guard the port.

94. Pikemen are to be covered by the Marines with their bayonets fixed.

FIREMEN.

95. With broadside guns, one Fireman is to be taken from each gun's crew, and from pivot guns two. Each Fireman is to have a fire-bucket at hand near his gun, and to wear his battle-axe in a belt around his waist.

SAILTRIMMERS.

96. In *all* vessels there will be two divisions of Sailtrimmers, composed of all the men at the spar-deck guns, except 1st Captains, 1st Spongers,

1st Loaders, and Powderboys. The 1st Sailtrimmers are to be taken from the guns on the forward half, and the 2d Sailtrimmers from those on the after half of the spar deck.

97. In vessels carrying guns on more than one deck there are to be three divisions of Sailtrimmers, called 1st, 2d, and 3d Sailtrimmers, and the third division is to be made up of one man from each gun's crew on the other deck or decks, as designated in the tables.—(*Article* 101)

This third division of Sailtrimmers is to be regarded as a reserved force, and is not to repair on deck at the *general call* for Sailtrimmers, nor except when specially ordered. Besides serving to reinforce the other two divisions when absolutely necessary, it is also to serve to reinforce either the Firemen or the Pumpmen in cases of need.

98. The third division of Sailtrimmers, and all the Pikemen of the gun's crews, and others armed with muskets, (*see Tables, article* 101,) may be made to assemble together as a body of Musketeers, either for landing or otherwise. No one gun more than another will be weakened by so doing; and this suggests the propriety of preferring these men ordinarily for the crews of boats.

PUMPMEN.

99. Each gun's crew composed of as many as 14 men is to furnish two, but when of less than 14 men, one Pumpman only.

100. When Pumpmen are sufficiently numerous to admit of working the pumps well with one-half their force, they should compose two divisions, to be called 1st and 2d Pumpmen.

DISTRIBUTION AND ARMS OF MEN AT THE GUNS.

101. The annexed tables show the stations of guns' crews at pivot guns, and at broadside guns, when composed, respectively, of the following numbers of men: 24, 16, 14, 12, 10, 8, or 6; how each man of a gun's crew is to be armed, and the number of small arms of all kinds required for each gun's crew.

N. B.—To these tables is annexed another, showing the small arms of the master's division.

PIVOT GUN'S CREW COMPOSED OF 24 MEN AND A POWDERMAN.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
1st loader, 2 B	3			1	1				
		4	1st sponger, 2 B	1	1				
2d loader, 1 B	5			1		1			
		6	2d sponger, 1 B	1		1			
1st shellman and pump	7								1
		8	2d shellman and pump						1
1st front lever, 2 B	9			1	1				
		10	2d front lever 1 B	1		1			
1st compressor and pike	18						1	1	
		14	2d compressor and pike				1	1	
1st rear lever and pike	11						1	1	
		12	2d rear lever and pike				1	1	
Tr. tackle, deck block, 2 B	17			1	1				
		18	Tr. tackle, deck block, 1 B	1	1				
Tr. tackle, slide block, 2 B	19			1		1			
		20	Tr. tackle, slide block, 1 B	1		1			
Shifting tackle, deck block, and pikeman.	21						1	1	
		22	Shifting tackle, deck block, and pikeman.				1	1	
Shifting tackle, slide block	23							1	1
		24	Shifting tackle, slide block					1	1
1st train lever and fireman	15								1
		16	2d train lever and fireman						1
1st captain, 2 B	1			1	1				
		2	2d captain, 1 B	1	1				
Powderman	25								
Total number of arms				12	7	5	6	8	6

GUN'S CREW COMPOSED OF 16 MEN AND A POWDERMAN.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
		4	1st sponger, 2 B	1	1				
1st loader, 2 B	3			1	1				
		6	2d sponger, 1 B	1		1			
2d loader, 1 B	5			1		1			
		8	2d shellman and 1st pump						1
1st shellman, 2d pump	7								1
		14	2d side tackle, and pike				1	1	
1st side tackle, and pike	13						1	1	
		16	2d port tackle, and pike				1	1	
1st port tackle, and pike	15						1	1	
		12	2d train tackle, and sailtrim					1	1
1st train tackle, and fire	11								1
		10	2d handspike, 1 B	1		1			
1st handspike, 2 B	9			1		1			
		2	2d captain, 1 B	1	1				
1st captain, 2 B	1			1	1				
Powderman									
Total number of arms				8	4	4	4	5	4

N. B.—On other than lower decks, for Port Tacklemen substitute 3d and 4th Side Tacklemen.

GUN'S CREW COMPOSED OF 14 MEN AND A POWDERBOY.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
		4	1st sponger, 2 B	1	1				
1st loader, 2 B	3			1	1				
		6	2d sponger, 1 B	1		1			
2d loader, 1 B	5			1		1			
		8	2d shellman and 1st pump						1
1st shellman and 2d pump	7								1
		14	2d side tackle. and pike				1	1	
1st side tackle. and pike	13						1	1	
		12	2d train tackle. and sailtrim					1	1
1st train tackle. and fire	11								1
		10	2d handspike. and pike				1	1	
1st handspike., 2 B	9			1		1			
		2	2d captain, 1 B	1	1				
1st captain, 2 B	1			1	1				
Powderboy									
Total number of arms				7	4	3	3	4	4

GUN'S CREW COMPOSED OF 12 MEN AND A POWDERBOY.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
		4	1st sponger, 2 B	1		1			
1st loader, 2 B	3			1	1				
		6	2d sponger, 1 B	1		1			
2d loader, 1 B	5			1		1			
		8	2d shotman and pump						1
1st shotman and pike	7						1	1	
		12	2d train tackle. and sailtrim					1	1
1st train tackle. and fire	11								1
		10	2d handspike. and pike				1	1	
1st handspike. and pike	9						1	1	
		2	2d captain, 1 B	1	1				
1st captain, 2 B	1			1	1				
Powderboy									
Total number of arms				6	3	3	3	4	3

GUN'S CREW COMPOSED OF 10 MEN AND A POWDERBOY.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
		4	1st sponger, 2 B	1		1			
1st loader, 2 B	3			1	1				
		6	2d sponger, 1 B	1		1			
2d loader and pike	5						1	1	
		8	2d shotman and pump						1
1st shotman and fire	7								1
		10	Train tackle					1	1
1st handspike. and pike	9						1	1	
		2	2d captain, 1 B	1	1				
1st captain, 2 B	1			1	1				
Powderboy									
Total number of arms				5	3	2	2	3	3

GUN'S CREW COMPOSED OF 8 MEN AND A POWDERBOY.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
		4	1st sponger, 2 B	1		1			
1st loader, 2 B	3			1		1			
		6	2d sponger and pike				1	1	
2d loader and pikeman	5						1	1	
		8	T. T., fireman					1	1
Shotman and pumpman	7								1
		2	2d captain and handsp., 1 B	1	1				
1st captain, 2 B	1			1	1				
Powderboy									
Total number of arms				4	2	2	2	3	2

GUN'S CREW COMPOSED OF 6 MEN AND A POWDERBOY.

Titles of gun's crew on left side of gun.	Gun Nos.		Titles of gun's crew on right side of gun.	ARMS.					
				Swords.	Revolvers.	Pistols.	Pikes.	Muskets.	Battle-axes.
		4	1st sponger and pikeman				1	1	
1st loader, 2 B	3			1		1			
		6	2d sponger, fireman					1	1
2d loader, shot., and pump	5								1
		2	2d capt., hdspk., train tackle., 1 B	1	1				
1st captain, 2 B	1			1	1				
Powderboy									
Total number of arms				3	2	1	1	2	2

SMALL ARMS OF MASTER'S DIVISION.

Stations.	Ratings.	Arms.
Conn	Quartermaster	Pistol and Sword
Wheel	Quartermaster and Seamen	do
Signals	Quartermaster	do
Do	Boys	Pikes
Relieving Tackles	Quartermaster and O. S	Swords
Main Braces	C. A G	Pistol and Sword
Mastmen	B. M	Pistol, Sword and Battle-axe
Do	Seamen and O. S	Pikes and Battle-axes
Topmen	do	Muskets
Forecastle	C. F	Pistol and Sword
Bell	S. C	do

102. The Captain will designate the different hatchways which shall be used by the Boarders and others from each gun when they are called upon deck at quarters. Cutlasses should not be drawn nor bayonets fixed until ordered, and in moving from one part of the deck to another should be sheathed to avoid accidents.

103. The use of *fire-arms* in the tops being considered dangerous, and only admissible under very peculiar circumstances, they are never to be used there without the express direction of the Captain.

CHAPTER III.

DUTIES AT QUARTERS, IN BATTLE OR EXERCISE.

CAPTAIN.

104. The CAPTAIN, when at general quarters, either for exercise or in action, is to superintend and take the general direction of everything connected with the management of the ship and the service of her armament.

105. He will from time to time carefully inspect the ship, in order, before commencing a general exercise, to ascertain that all the required and proper preparations have been made for battle. When time and other circumstances will permit, he will always make this inspection before going into action, and when prevented from making it personally he will direct it to be made by the Executive Officer.

106. When engaged with an enemy at so great a distance as to require the guns to be elevated, he will, if practicable, cause the distance to be ascertained by observation, and when that cannot be done, will estimate the distance, and from time to time send directions to the Officers of gun divisions for what distances the sights of their guns should be set, and the nature of the projectile, and, if a shell be used, the time of the fuse, (*see article* 374.) and also the cartridges to be used, whether for "distant," "ordinary," or "near" firing.

107. He will determine and direct when two shot may be fired; when "quick-firing" may be permitted; when small arms shall be distributed and loaded; when Boarders shall be called up, and when they shall assail an enemy. He will receive, through the Executive Officer, the reports from all Officers commanding divisions.

EXECUTIVE OFFICER.

108. The EXECUTIVE OFFICER, under the direction of the Captain, and with the aid of the Master, will work the ship when in action or at general

quarters.* He will receive the reports of the Officers of the different divisions and others, and communicate them to the Captain of the ship.

SIGNAL OFFICER.

109. The SIGNAL OFFICER is to see that everything is prepared for making and answering signals promptly, and will make all such as the Captain may direct. He will provide himself with a watch, pencil, and signal note-book properly ruled.

110. He will note and report to the Captain all signals that are made to or by other vessels of the squadron, or other vessels in sight, and also note the time at which each signal was made. He will observe and report any material change which may take place in the positions of the vessels of the squadron, or of other vessels, and every event of moment that may occur.

MASTER'S DIVISION.

111. The MASTER will cause the persons in his division to sling the yards and gaffs, to stopper the topsail sheets, to lead out the preventer and other braces, and will see that they are clear, and toggled to prevent them from unreeving.

112. He will have the *fighting stoppers* at hand in the chains and tops for stoppering the rigging; hatchets and axes ready for clearing away any casual incrumbrances from the guns; axes and hatchets for this purpose must be sharpened, covered with painted canvas, and labeled "not for general use;" and will cause proper arrangements to be made for applying and securing grapnels, if they should be required.

113. He will see that the hammocks are compactly stopped down, stowed and covered, and will cause the boat and boom covers to be hauled over and securely stopped down; the relieving tackles to be hooked and ready for

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* This arrangement continues to the Executive Officer his usual duties when all hands are called for other special purposes; it also places him where he will always be immediately informed of all the evolutions ordered by the Captain, as well as of the objects proposed to be accomplished by them, and in case any accident should disable the Captain, the Executive Officer will be ready to carry out his views without mistake or delay.

By employing the Master as an assistant to the Executive Officer, additional security is given against any confusion or delay, which might otherwise be caused by the inability of either of the superior officers to continue the performance of their duties.

use; a compass to be placed to steer by; and see the spare tiller at hand, and the chronometer and other instruments put out of the reach of shot, and as much as may be relieved from the jar of the guns.

114. In case the Captain should give orders for sending small arms and ammunition into the tops, he will attend to having them sent there, and will be watchful that they are not so used as to expose the sails and rigging to danger from taking fire; and in order to furnish a sufficient supply of water, in case of accident, he will have four fire-buckets fitted for each top, with laniards long enough to reach the water from the yard arms, and these should be filled with water in preparing for action.

115. On the probability of an engagement, when the ship is on soundings, the Master will have the ground-tackling ready and clear; boats ready for getting out, and every preparation made for towing, warping, anchoring and getting springs upon the cables; and have leads and lines in the chains. If at anchor, he will have the boats dropped astern, the oars secured to the thwarts, and, if directed, have the plugs ready to be taken out that the boats may fill, and also cause the spare spars to be put overboard.

116. Whenever the cables are bent that they shall be kept stoppered until wanted for use.

117. In action, besides aiding the Executive Officer in working ship, the Master is to pay special attention to the steerage of the vessel, and to the rigging, sails and spars, and will see that the stoppers are properly applied, and damages repaired as speedily as possible.

In vessels where there is no Signal Officer, the Master, in action or general exercise, may be directed to perform the duties of Signal Officer.

118. The Boatswain, being the assistant of the Master, is to see that the rigging, especially forward, is kept clear, and that all damages are promptly reported and repaired. In the absence of the Master, all the above preparations will be at once made by the Boatswain, and reported to the Executive Officer by him.

ENGINEER'S DIVISION.

119. The CHIEF ENGINEER will see all proper preparations made for repairing damages to the engine and its dependencies, and will have the apparatus for extinguishing fire ready for immediate use. As soon as these preparations are fully made, and his men mustered, he will report his division ready to the Executive Officer. He will also report such damages

as may be received in action, and what assistance is required to repair them. And he will have charge of the preparations made for extinguishing fires below.

POWDER DIVISION.

120. The Officer commanding this division, when called to quarters for general exercise or action, will receive from the Captain the keys of the magazines and shell rooms, and of their respective water-cocks, and will deliver them to the persons in charge, who are not to open them without his special order.

121. He will have the fire screens let down, and the light rooms and the deck under his charge lighted.

122. He will see that the shot and shell whips are in place and in working order, and that shot troughs are placed for conveying shot where required; that the Gunner and his Mates at the magazine hatches and scuttles, and the persons stationed at the shell room scuttles, are ready to open them when the order is given.

123. That all the precautions mentioned in the duties of Gunner and Carpenter have been taken against fire, namely: that the division tubs are filled with water, and that wet swabs are placed by them and under all the lower scuttles through which passing-boxes are returned; that a *fire tub* is placed at the bottom of each shoot for the return of empty boxes; that it is nearly filled with water and has its wire grating shipped; that a proper supply of fresh water is provided for the use of the men; that the hatchways of the decks next above that on which the Powder Division is stationed are properly covered; that the air ports are closed and secured; and that the hose is screwed to the force pumps and ready for use.

124. He is to see that the means which are provided for lowering the wounded are ready and properly fitted, and that the wounded, when lowered down, are conveyed to the part of the vessel set apart for the Surgeon's Division.

125. He will also see that all obstructions to the safe and rapid passage of powder, shot, and shells are removed, and when every preparation for action has been made in his division, will report it ready to the Executive Officer.

126. When the order is given from the Captain to open the magazines, shell rooms, and scuttles, he will direct the Gunner and Gunner's Mate to repair to their respective scuttles, put on their magazine dresses and shoes,

divest themselves of every article of metal, and see that the men stationed with them do the same; they are also to see that wet swabs and cans of fresh water are provided.

127. The magazines being opened, the lids of the tanks are not to be unscrewed until orders are given to that effect. Then the Gunner and his Mate, and their assistants in their respective magazines, will open as many, and no more, tanks than are necessary to supply charges of the kind ordered, which they will pass up to the men stationed on the deck above to receive them. These men will be particularly careful to observe the orders transmitted from time to time designating the kind of charges required at the guns.

128. While at general quarters he will see that the men preserve their proper stations in silence, order, and coolness; and he will give particular attention to the sufficient and correct supply of powder and projectiles to the various divisions, and that in time of action, or of exercise with powder, the passing-boxes, after being once taken out of the magazine, are not passed into it again, *or even inside of the screen*, during the whole of such action or exercise.

These duties are of the highest importance.

129. In exercise where no powder is used he will see that such substitutes for the various charges as the Captain may direct are passed up in their proper boxes, so that the number of rounds and the kind of charge, whether "distant," "ordinary," or "near," may be ascertained and compared with those ordered. Should any defect or deficiency in the arrangement for giving a full supply to the guns be discovered, it is to be reported immediately to the Captain, in order that a remedy may be applied as speedily as possible by additional men or other proper means.

130. The Carpenter will see that the hatches on the deck next above the berth deck or orlop are properly covered with gratings and tarpaulins, and that the air ports are closed and secured.

131. He will then cause all the pumps to be rigged, namely, the main pumps, for freeing the ship in case of leaks, and the force and channel pumps. He will have the engine also rigged and filled to supply water for extinguishing fire.

132. He will attend particularly to the preparations for stopping shot-holes, and see that all the articles enumerated in his general duties (*article* 58) are distributed among his mates and crew.

133. He will, when directed, cause the cabin and other bulkheads to be

taken down, and every other obstruction removed which comes within his department, and may interfere with the working of the guns or the passage of ammunition, and, having performed this service, will report to that effect to the Officers of the Divisions in which such obstructions existed.

134. When these preparations are completed he will see that the men under his direction are in their proper stations, and, when all their preparatory duties have been performed, will so report to the Executive Officer, and to the Officer commanding the Powder Division what relates to that division.

135. During an action the Carpenter will attend the pumps, sound the well frequently, and, should he discover indications of serious injury below the water line, will immediately make them known personally, either to the Captain or to the Executive Officer, *and to them only.*

136. During an action, such of the Carpenter's crew as are stationed in the wings, or on the orlop, in line-of-battle ships, or on the berth deck in other vessels, will be constantly on the look out for shot-holes.

When a shot enters they are to make its position known by reference to the numbers of the ports under or near which the hole is found, and its distance below or above the water line, as shown by the interior line corresponding to it, already described in the general duties of the Carpenter, (*article* 59;) and are also to apply promptly such remedy themselves as may be in their power.

137. The MASTER-AT-ARMS, assisted by the Ship's Corporals, will see the galley fire and all unauthorized lights put out; that the lamps are in their places, properly trimmed and lighted; and that the lenses and reflectors are cleaned.

After the magazines have been swept, closed and secured, and the retreat has been beaten, the Master-at-arms will see that the lights in the light rooms are extinguished, and apply to the Executive Officer for permission to renew the usual lights and fires.

SURGEON'S DIVISION.

138. The SURGEON or senior Medical Officer will see that all necessary preparations are made for the reception and treatment of the wounded in the part of the ship which may have been set apart by the Captain for that purpose, and report to the Executive Officer when such preparations are completed.

139. He will cause a sufficient number of *tourniquets,* or temporary

substitutes for them, to be distributed to the Quarter Gunners of the different divisions, and to such men in each top as may be appointed to receive them; and he will take care that the persons in his division, and such others as the Captain may direct, are instructed in the use of tourniquets, to prevent, as far as possible, any dangerous loss of blood before the Surgeon or his Assistants can attend to wounded men.

OFFICERS COMMANDING DIVISIONS OF GUNS.

140. Each Officer Commanding a Division of Guns is to see that all persons belonging to it are present; that all the prescribed arrangements are duly and promptly made; that every article designated for use in the division is in order and in place; that the decks are wet and well sanded; that the hand swabs at the guns are wet; and that any small arms that may be distributed among the men of his division are properly loaded at the time directed by the Captain.

141. In action he will cause the wounded of his division to be promptly and properly conveyed to the Surgeon, but will see that no man leaves his quarters on pretence of assisting the wounded. Four men, "aids to wounded," should be attached to each Division of Guns, so as not to take men from guns for that purpose.

142. On the lower deck of line-of-battle ships, or the main deck of frigates and spar deck of single-deck vessels, he will see the hatchways in the range of his division properly covered by the Carpenter's crew, and the scuttles and whips duly prepared for passing powder, shot, and shells.

143. He will be particularly careful to prevent the men from loading the guns improperly, or otherwise than may be specially ordered, and will prevent any unnecessary noise.

144. He will see that the guns are very carefully pointed and properly aimed; that there is no firing until correct sight can be obtained, as random firing is not only a waste of ammunition. but it encourages an enemy when he sees shot and shell falling harmlessly about and beyond him.

He will carefully impress upon the Captains of guns that there is no excuse for several successive bad shots, as observation of the first or second will surely indicate an erroneous estimate of distance, and afford means of correcting it. Accuracy of fire is to be encouraged rather than rapidity.

145. He will also take care to prevent confusion at the powder scuttles in the range of his division, and that all orders which require to be repeated are duly passed. In case of accident to the Powder Passers, he will

promptly supply their places by such men as can be best spared from his division.

146. He will take care that each gun in his division is provided with all the "Equipments and Implements" prescribed for its use; and that the "spare" articles which may be required in his division in action are in place.—(*Article* 148.)

147. He will report to the Executive Officer when all preparations have been made for action; and also, after action and exercise, when the guns have been properly secured, and the stores and implements belonging to his division have been returned to their places.

EQUIPMENTS AND IMPLEMENTS.

148. Those for broadside guns, whether mounted on two or four truck carriages, or on slides, are to be as follows, viz:

Articles for each gun.	Where they are to be put when the gun is secured.
Carriage complete, with bed and quoin, or elevating screw.	At its port.
Breeching with shackle-bolts and pins....	At the gun.
Compressors and levers, pivot-bolt and housing chock, for Friction Carriages.	Do.
Two side-tackles......	Hooked to the side-tackle bolts on each side of the port and of the carriage.
One train-tackle.....................	Hooked to the side-tackle bolts in the side, with the parts of the fall round the breech of the gun.
Two handspikes[*].....................	Resting on the bed bolt, inboard ends secured by beckets.
One tompion with laniard and wad......	In the muzzle of the gun.
One sponge and cap[†]......	On the beam or carling over the right side of the gun, (on movable brackets.)
One rammer[†].......................	On the beam or carling over the left side of the gun, (on movable brackets.)

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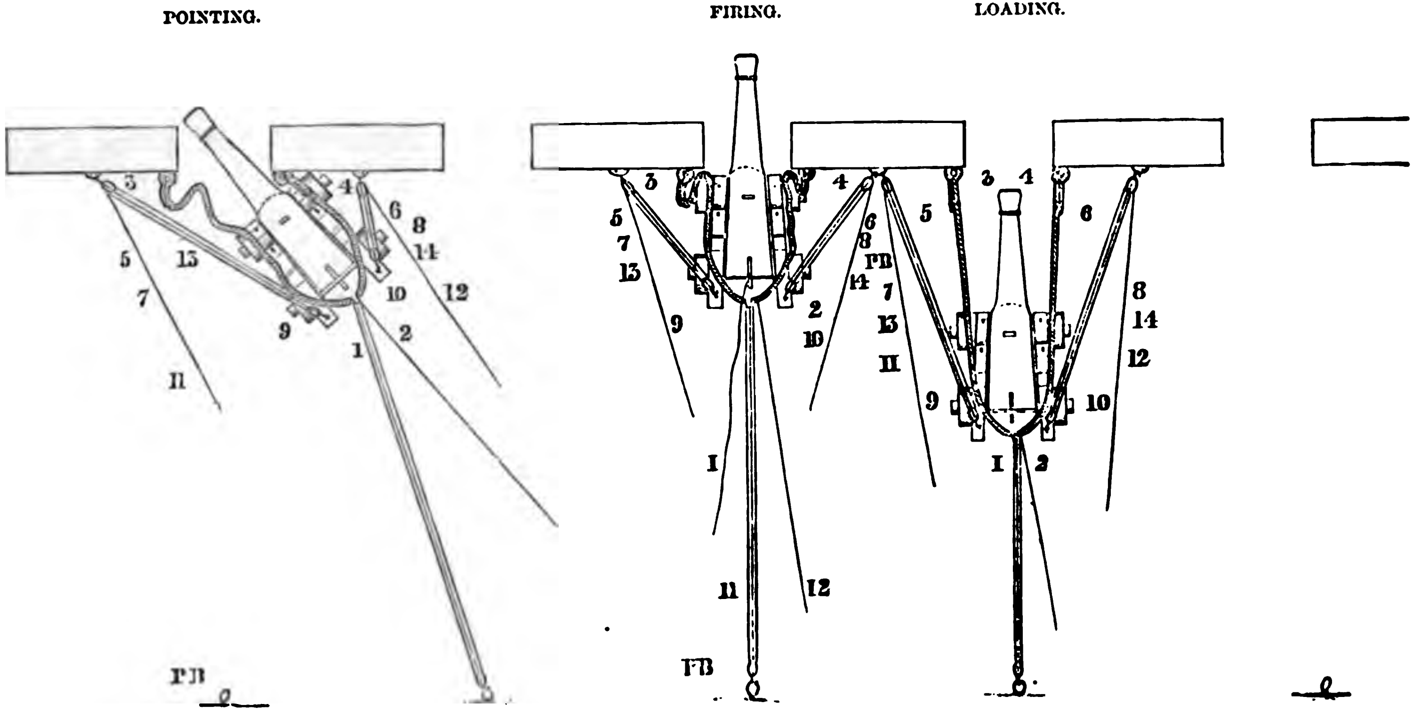
[*] *Marsilly* carriages require a roller handspike each.

[†] The rammers and sponges belonging to the broadside guns of spar-deck divisions of all ships having topgallant forecastles, or other light decks, may be kept under the forecastle or light deck when not in use. In ships not provided with these decks they are to be kept at the guns inside the brackets; or, if that cannot be done, triced up overhead on the next deck below.

Articles for each gun.	Where they are to be put when the gun is secured.
One lock with string and vent plug complete, with cover and strap.	In place on the gun.
One breech sight with cover............	Do.
One re-enforce sight with cover.	Do.
One priming wire and one boring bit, with beckets for the wrist.	Inside of the brackets of the carriage, near the breech.
One fire-bucket with laniard	On gun-decks, close to the side, near the beam over the gun; on spar-decks, round the capstan and the boats forward.
One battle lantern, with candle or lamp trimmed and primed, but provided for gun-decks only; none for spar-decks.	In the fire-buckets. The candle in supply box.
Battle-axes, (as prescribed according to the number of men at gun.)—*See art.* 101.	Inside of the brackets.
One hand swab..............	On the breast piece of the carriage.
Two checking quoins for truck carriages..	When not in use, between the brackets and the bed.
Two laniards for each half port..........	In place.
Laniards, chain pendants, runners and tackles for tricing up, and bars and keys for securing lower deck ports.	In place.
Ten shot for shot guns................	In racks round hatches nearest the gun.
For shell guns, one shell in its box......	Between the trucks on the left side of the gun.
Ten selvagee wads for shot and shell guns.	On the breast piece of the carriage strung on a pin.
Two housing chocks for lower deck guns..	Placed before the *front trucks* when the gun is run in for housing.

149. He will also assure himself that the following articles, which may be required, are in readiness in his division, and prepared for use, namely: One rattle for calling Boarders; one division tub for fresh water; one spare bed and quoin for carriages requiring them; two spare gun trucks; four spare handspikes; one worm; one scraper; one bristle sponge; two spare breechings; four swabs, and, if any of the guns be on slides, a spare pivot-

[Diagram A.]



POINTING.

FIRING.

LOADING.

14 men and a boy, stationed at a 57 cwt. Gun, only one side being manned by the full crew.

BROADSIDE GUNS.

STATIONS AND GUN NUMBERS.

152. The following are to be the ***gun numbers and stations*** for a gun's crew composed of sixteen Men and a Powderman, when working broadside guns on lower decks; ***on other*** decks 15 and 16 are 3d and 4th Side Tacklemen.

Left side.	Gun Nos.		Right side
First Loader	3	4	**First Sponger.**
Second Loader	5	6	**Second Sponger.**
First Shotman	7	8	**Second Shotman.**
First Handspikeman	9	10	**Second Handspikeman.**
First Side Tackleman	13	14	**Second Side Tackleman**
First Port Tackleman	15	16	**Second Port Tackleman.**
First Train Tackleman	11	12	**Second Train Tackleman.**
First Captain	1	2	**Second Captain.**

Powderman near the midships, and on the left of the gun.

For a gun's crew of ***fourteen men*** and a Powderboy, or of ***twelve men***, the higher numbers are those to be omitted, and the stations and duties of all the others remain unchanged. (*See Diagrams A and C.*)

With a gun's crew of ***ten men***, all the numbers continue with the same stations and duties excepting No. 10, who becomes Train Tackleman, and the 2d Captain handles the handspike. (*See Diagrams B and D.*)

With a gun's crew of ***eight men***, numbers from 1 to 7 inclusive retain the same stations and duties; No. 2 will, in addition to his duties as 2d Captain, also attend to the handspike, and No. 8 becomes Train Tackleman.

With a gun's crew of ***six men***, all the numbers retain the same stations and duties, excepting that No. 5 also acts as Shotman, and No. 2 attends to the handspike and train tackle in addition to the duties of 2d Captain.

153. This arrangement exhibits the gun's crew placed as the men should stand when first assembled at quarters, either for inspection or any ordinary exercise. It is intended that the men are then to stand parallel with the gun, and facing in-board.

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154.

CALLS FOR ASSEMBLING AT QUARTERS

BEATS OF DRUM.

1st. THE ORDINARY BEAT will be the call for INSPECTION at general quarters.

2d. The ORDINARY BEAT, *preceded* by ONE ROLL—EXERCISE at general quarters, *without powder.*

3d. The BEAT QUICK—ACTION; or EXERCISE at general quarters *with powder,* as though engaged IN BATTLE.

4th. "WHEN AT QUARTERS," a *roll of the drum* will be a signal for "SILENCE AND ATTENTION!" All firing will immediately cease, and the next order awaited.

155. On assembling at quarters for inspection or general exercise, unless directed otherwise, *in port,* the men are first to go to the starboard guns on the spar deck, the port guns on the main deck, the starboard guns on the next deck below, and so on. *At sea* they are first to go to the weather guns, or, if the ship be dead before the wind, to the same sides as in port.

156. When assembled for *inspection,* besides seeing that all the guns and articles belonging to them are in order and in place, it is suggested that the men, without arms or implements, or casting loose the guns, shall be frequently called away *and mustered* in their stations as Boarders, Pikemen, Sailtrimmers, and Firemen; and also practiced in shifting from one side to the other, and in taking their places for fighting both sides at once.

157. On assembling for exercise at general quarters without powder, after the men have been mustered and the divisional reports made, the order will be given: "CAST LOOSE AND PROVIDE!"

Then the starboard watch will *provide and cast loose* the odd numbered guns, and the port watch will *provide and cast loose* the even numbered guns.

The 1st parts of guns' crews on the *starboard side* providing and casting loose the *starboard,* and the 2d parts the *port* guns. The 1st parts of guns' crews on the *port side* the *port,* and the 2d parts the *starboard* guns. In securing guns the same order of distributing the men is to be observed.

When both these services of providing and casting loose have been performed, and the luffs choked or hitched and trucks chocked, the men are all to return to the guns at which they were mustered, and, taking their places, await in silence further orders, if not already given.

158. When assembled for exercise as though actually engaged in battle, besides what is prescribed for an exercise at general quarters without powder, the further preparations indicated hereafter will be made. *The guns' crews will proceed at once to provide and cast loose both sides without waiting to be mustered, or for any further orders.*

159. The call for *Boarders* to repair to the spar deck will be by the *rattle* and verbal order, repeated by the Officer of each division of guns. They should be trained to form promptly on the opposite side to that engaged, near the hatch by which they ascend.

On the first call or order the first division only will repair to the spar deck, led by their officers. If the call or order should be repeated before the first division shall have returned to their guns, the second division will immediately repair to the spar deck.

160. The call for "*Pikemen*" to "*repel boarders*" will be by *sounding the Gong.* At this signal *all* the Pikemen will assemble on the spar deck with their muskets.

161. "*All hands*" will be summoned to *repel boarders* (*see article* 92) by springing the rattles and sounding the gong together, and by verbal orders.

162. "*Sailtrimmers.*" The particular division that may be wanted at a time will be called by *passing the word for it.*

163. The call for "*Firemen*" to repair to the spar deck will be given *verbally* and by *striking the ship's bell rapidly.* The *rapid* ringing of the bell will be the FIRE ALARM at all times, when the crew will immediately assemble at quarters.

164. *Boarders, Pikemen,* and *Sailtrimmers* of the *spar-deck guns,* or any portion of them, and of the Master's division, as well as the Marines, may be ordered from their quarters to perform a particular service, *without any call,* whenever the Captain may deem proper.

165. Men called for any of the foregoing duties will, on reaching the spar deck, form on the gangway, upon the side not engaged with the enemy, unless otherwise directed at the time.

166. When called to quarters every person is to repair to his station promptly and without unnecessary noise; and on the order "*to your quarters*" all will return to their stations in the same manner.

PREPARATIONS FOR EXERCISE

AT GENERAL QUARTERS WITHOUT POWDER.

167. Sling the topsail yards and gaffs and put the preventer braces in place; distribute fighting stoppers and jiggers; stopper the clews of the topsails; get whips on each side of the lower masts for tricing up the pendant tackles, and also the mast bands and fishes required for securing a crippled mast. Make arrangements for using grapnels; get hauling lines ready for sending small arms and ammunition into the tops; if not on soundings, haul over boat and boom covers and stop them down; bring up and stow hammocks, if down;[*] haul over and secure the hammock-cloths; hook and mouse the relieving tackles; place the spare tiller and compass at hand; put the chronometers, and other instruments of navigation, out of the reach of shot; distribute the small arms, together with their accoutrements and a supply of filled cartridges, to the men appointed to use them; place axes and hatchets at hand on the spar deck for clearing away incumbrances at guns.

If underway and on soundings, get the boats ready for hoisting out; the ground tackle ready for use and keep it clear, and make every preparation for towing, warping, and anchoring with springs on cables; stopper the chains; get lights in the light rooms, including those of the shell rooms; light powder division; also gun-decks, if at night, *and it be ordered by the Captain;* drop magazine screens; get shot and shell whips, and buckets or nets, in place; rig canvass shoots for returning empty passing-boxes; remove every obstruction to the free passage of powder; clear away and open shot-lockers; see the hatchways of the next deck above the powder division properly covered; division and fire-tubs in place, with wet swabs by them, and at the landing of each line of scuttles through which the passing-boxes pass; rig main, force, and channel pumps and fire engine, which fill with water; get light Jacob-ladders and slings ready for lowering the Carpenters outside and materials for stopping shot-holes; take down cabin and other bulkheads, when directed, and pass them below; sand the decks; place a bucket of water and a wet swab in rear of each gun; have spare breechings at hand; rope ladders for hatchways in place; a bag, to be supplied from one reserve box, containing a flask of priming powder and the following *spare* articles: two locks, four lock-strings, eight thumbstalls, two boring-bits, two priming-wires, a shackle-punch and pins and some old rags, to be slung round the neck of each Quarter Gunner of each division of guns; rammers and sponges placed, and the latter uncapped; one worm in place, on each side of the deck, for each division, and a ladle at hand for each calibre on board; pistols, in frogs furnished with cartridges and caps, and cutlasses and battle-axes, belted round the respective persons designated to wear them; marines accoutred and under arms, and distributed as the Captain may direct; tourniquets to be distributed, as may be judged necessary, to each Quarter Gunner of a division, or otherwise. (*See articles* 139 *and* 151.)

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[*] The Executive Officer of the ship should appoint a sufficient number of men in each watch for the purpose of stowing the hammocks of the watch below in case of being called to quarters in the night, so as to prevent confusion and insure the greatest possible despatch in clearing for action. The requisite number of men for this purpose is as follows:

For a Ship of the line, twelve men in each watch.
" Frigate, ten " " "
" Sloop-of-War, eight " " "

By this arrangement four men will always be at hand to stow each netting. The stowage should commence in the middle and at each end at the same time, the men placed in the middle standing face to face and stowing towards the ends, while the others stow towards the middle of each netting. Hammocks make the best stowage on the bight and perpendicular, when that method can be followed.

PREPARATIONS FOR EXERCISE

AT GENERAL QUARTERS WITH POWDER, OR AS THOUGH ENGAGED IN BATTLE.

168. Crew cast loose the guns; shell rooms and magazine are opened; powder and shells passed up, and everything ready for firing, the order for which is awaited. If the beat is followed by orders from the quarter-deck to fire, then this is performed as soon as each gun is ready. In this case, besides what has just been prescribed for a General Exercise *without powder*, the following further preparations will be made: Put out galley fire and all unauthorized lights; light match and place it in manger; open magazines and powder tanks, and also shell rooms, when ordered; close and secure air-ports; fill division and fire tubs with fresh water; place cans of fresh water and wet swabs in magazines and shell rooms; light up the cockpit, or other place, for the wounded; place mattresses, and, if there be room, sling spare cots; get ready the amputating table, instruments, bandages, lint, medicines; have a plentiful supply of fresh water and swabs, and sprinkle the decks. Make a particular examination of all the arrangements for extinguishing fire; see that force-pumps and hose are in good order, and the men stationed at them in their places.

PROVIDING BROADSIDE GUNS.

169. When the exercise of broadside guns is to be confined to one side only, each *gun's crew* is to provide its own gun, on the side at which it is ordered to assemble, as follows: but when the guns on both sides are to be exercised at once each *part* of a gun's crew is to provide its own gun; each Captain, Loader, Sponger, &c., doing separately what is done by both himself and his second when the exercise is confined to one side only.

170. Captains of guns to provide themselves with percussion primers, thumbstalls, and priming-wire, and to see that the men of their respective parts of the gun's crew discharge their several duties promptly and carefully.

171. Spongers provide sponges and rammers.

172. Loaders provide a bucket of water and a wet swab.

173. Shell or shotmen provide a sufficient supply of selvagee and six junk-wads, and supply the racks along the waterways and hatchways with shot from the lockers as required.

174. Handspikemen see the handspikes in place, and then assist in getting up shot for the guns.

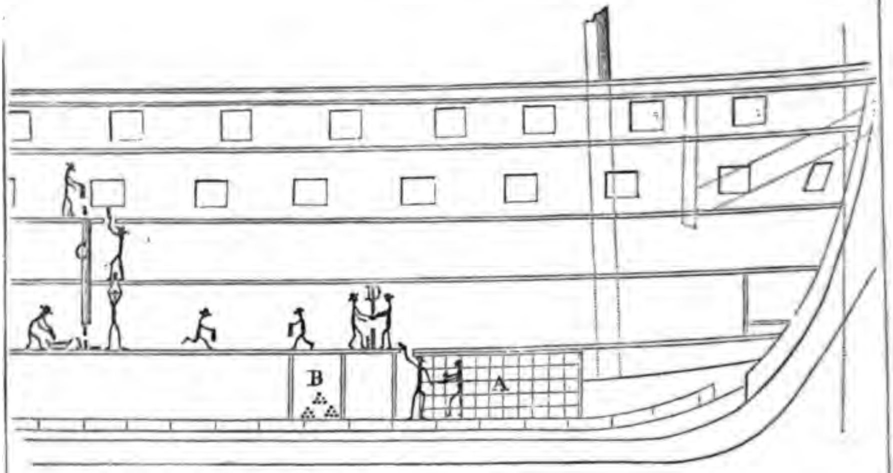
175. The Powderman or Boy is to provide an empty passing box, if no powder is to be used; otherwise he is to present himself at the appointed place to receive a full one.

176. The Fireman is to take down the fire bucket and place it and the battle lantern in their appointed places. On gun-decks the lantern should be hung up at the ship's side, or in rear of and between the guns, as may be directed, and lighted when ordered by the Captain, and the fire bucket directly in rear of the gun. On spar decks the bucket may be laid on the deck, or hung up in any convenient place in rear of and near the gun.

177. Side tacklemen provide sand and water, and sprinkle and sand the decks, if directed.

178. Quarter Gunners of divisions, besides equipping themselves, as already directed, (*article* 167,) with a bag of spare implements, will attend to the "Supply" and "Reserve" boxes of their divisions, (*see article* 150,) and distribute the belts, primer boxes, and other articles which they contain, to the guns' crews, as soon as practicable, and then keep themselves ready to furnish any reserved or spare articles which may be required, such as spare breechings, ladles, and worms, and will see the battle lan-

Passing Powder.

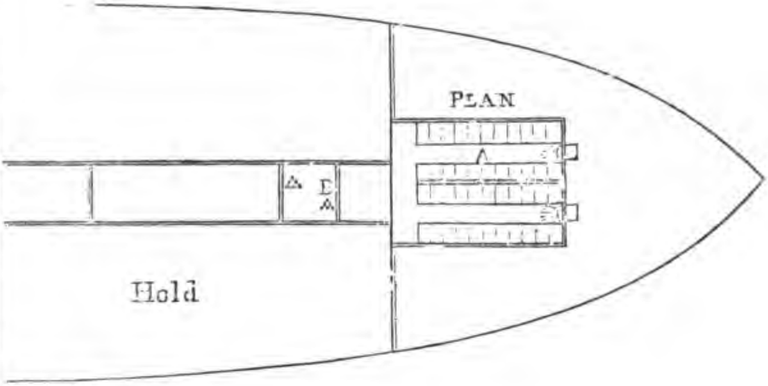


A. *Magazine.*

B. *Shot Locker.*

C. *Canvas Shoot, through which to pass down empty boxes.*

D. *Screen with hole in it, through which the cartridge is passed.*



terns provided with candles with primed wicks, ready for lighting when ordered by the Captain.

179. The swords and pistols should be always available for the Boarders, at the shortest notice; but their particular disposition at quarters, and at what time the pistols shall be loaded, will be determined by the Captain, as in his judgment circumstances at the time may require. Pistols should be loaded on the probability of action without further orders.

ARRANGEMENTS FOR DELIVERING AND DISTRIBUTING POWDER.

180. In making arrangements to deliver and distribute powder from the magazines, for action, the following general considerations and rules should govern.

181. Cartridges, as experience proves, can be passed up each independent chain of scuttles leading from the magazine to the point at which the Powderboys are to receive the full boxes, at the rate of one every six or seven seconds.

182. Experience also proves that, under the most favorable circumstances, the broadside guns of a man-of-war cannot be advantageously fired oftener than once every seventy-five seconds.

Hence it may be received as a rule that a single chain of passing scuttles is abundantly sufficient to supply powder for a division of guns as large even as eight of a side; and that it is also sufficient when both sides of such a division are to be used at once, for then the firing of each piece is unavoidably retarded by the division of the gun's crews.

183. No one chain of scuttles ought to be required to supply cartridges for more than a single description of guns,* unless their cartridges be the same in diameter, weight, and form, and their passing-boxes alike, as in the case of the 8-inch shell gun of 63 cwt. and the 32-pdr. of 57 cwt. If, therefore, there be on a deck of guns but one differing from the rest in calibre, class, or assimilation of cartridges, that one should have a separate chain of scuttles for its supply, in order to guard effectually against confusion, or, at least, delay. In a word, each additional calibre or class of guns, unless the cartridges be assimilated and the passing-boxes alike, involves an additional chain of passing scuttles for its supply; and it should be borne in mind that errors with respect to cartridges of guns of the same calibre, but differing in class, are more to be apprehended than with guns differing only in calibre.

184. If the guns on a deck be all of the same calibre and class, or of

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* See Table of Charges for Great Guns.

like cartridges and passing-boxes, then one chain of scuttles to supply the forward half of those guns, and another to supply the after half, will be all sufficient.

185. For each chain of passing-scuttles there will probably have to be:

One man in the magazine to deliver charges from the tanks.

One man in the passage to receive and pass those charges through the scuttle in the orlop or berth deck.

One man at the passage scuttle on the orlop, or berth deck, to receive the charges and pass them to the screen.

One man just outside of the screen to receive the charges through a flapped hole therein and put them in the empty passing-boxes.

One, two, or three Runnerboys (according to the distance) to run, on the orlop or berth deck, with full passing-boxes, from the screen to the scuttles through the deck, and back again with the empty boxes to the screen.

One man, a very careful one, at the bottom of the canvass shoot, to receive the empty passing-boxes, strike them, in an inverted position, over the fire-tub, and inspect them carefully before allowing them to be taken away to be replenished.

One man, on the orlop or berth deck, at the passing scuttle through the deck above, to pass up full boxes.

One man at the passing-scuttle on the next deck above the orlop or berth deck to receive and pass up full boxes, or, in the case of a single-deck vessel, or of distribution on the main deck of a frigate, or on the lower deck of a ship-of-the-line, to receive and deliver them to Powderboys.

One man at the passing-scuttle on the second deck above the orlop, or berth deck, to receive and pass up full boxes; or, in the case of a frigate, or distribution on the main deck of a ship-of-the-line of two decks, to receive and deliver them to Powderboys.

And one man at the passing-scuttle on the third deck above the orlop to receive and deliver full boxes to Powderboys on the spar deck of a ship-of-the-line of two decks.

Thus each chain of scuttles will require—

Seven men to supply its guns on the first deck above; as, for example, the lower deck of a ship-of-the-line, the main deck of a frigate, or the spar deck of a sloop-of-war, or other single-deck vessel.

Eight men for the spar deck of a frigate, for the main deck of a ship-of-the-line of two decks, or for the middle gun deck of a ship-of-the-line of three decks.

Nine men for the spar deck of a ship-of-the-line of two decks, or for the main deck of a ship-of-the-line of three decks.

And ten men for the spar deck of a ship-of-the-line of three decks.

Besides, each of these numbers—7, 8, 9, and 10—is to be increased by two or three Runnerboys, for the purposes above described.

186. In vessels of and above the class of frigates, or having two magazines—one forward and the other aft—the forward half of the guns on each deck is to be supplied from the forward magazine, and the after half from the after magazine. Thus, for each deck of guns, one scuttle at each of the two magazines, together with its corresponding chain of scuttles, will be sufficient, *if all the guns be of the same calibre and class*, or have like charges. But the introduction on board of any vessel of guns differing in either of these respects will involve the necessity above stated of a separate scuttle of delivery at the magazine, and also of a distinct chain of scuttles connected with it for the exclusive supply of each variety of charges that may be introduced.

In this case, the exceptional guns should be supplied, whenever practicable, from the larger magazine when there are two differing in size.

187. In single-deck vessels carrying more than sixteen guns, all of the same calibre and class, and having but one magazine, two scuttles at that magazine will be sufficient—one to supply the forward half of guns, and the other the after half.

188. In single-deck vessels carrying only sixteen guns, or less, all of the same calibre and class, or having like charges, one scuttle at the magazine will suffice.

189. Should any single-deck vessel be of such great length, or so remarkable in her armament of guns, although all of the same calibre and class, as to render additional scuttles advisable, they are to be cut.

PASSING-SCUTTLES.

190. All the powder is to be passed up from the orlop or berth deck through circular scuttles cut in the deck or decks at places, as nearly as circumstances will permit, immediately abreast of the middle of the particular set of guns to the supply of which each chain of scuttles is specially appropriated. Besides these scuttles for passing the powder up, there are to be corresponding ones for each set, provided with a canvass shoot for returning the empty boxes below. The drawing shows the manner of supplying an upper deck and returning the empty boxes from it. Each deck is to be supplied in like manner by a distinct and separate arrangement through as many independent sets of scuttles as may be required by the preceding "Arrangements for delivering and distributing powder."

191. Each scuttle is to have a tompion or other means of closing it, so as to be water-tight when not in use, and to be so placed or regulated in height as not to interfere with the transportation of guns.

192. Should any serious difficulty arise in finding places for cutting any of the different sets of scuttles through the decks, or in the cases of small or very wet vessels, recourse may be had to the gratings of the hatchways. Still, they are always to be cut through the decks whenever it can be done with propriety.

193. For each scuttle at the magazine for the delivery of powder there must be a corresponding flap-hole in the magazine screen, and this is to be regarded as a part of the chain of supply equally with the scuttle itself.

194. When on board ship there are any guns of the same calibre and class, or of assimilated charges, carried on two consecutive decks, all of them may be supplied by the same chain of scuttles, provided the whole number of guns, thus made to depend upon this chain, does not exceed eight of a side. For instance, under the circumstances stated, the chase, or a few shell or other guns on a spar deck, may be supplied by a chain of scuttles intended principally for the main deck guns; or, the shell guns on a main deck being few, may be supplied by a chain intended principally for the deck below.

195. In delivering cartridges from the magazines for serving guns they are to be passed up from the magazine to the orlop or berth deck before they are put into the passing-boxes, which, in time of action, or when exercising with powder, after being once taken out of the magazine, are not, on any account, to be allowed to go into it again, *or even inside of the screen*, during the whole time of such action or exercise. They are to be replenished at the screen, but outside of it.

196. All passing-boxes shall be painted black, with the calibre and charge painted in white letters, two and one-half inches (2½) long on the side, and one and a half (1½) on the top.

197. If, however, there are any guns of the same calibre on *spar decks* requiring lighter charges, the *lower half* of the box shall be painted *white*. For *gun decks* in similar case the *lower half* shall be painted *red*.

198. *Empty passing-boxes returned by the shoots* are always to be landed upon wet swabs, and then to be turned upside down and so struck over a fire-tub, as before directed, to free them from any loose fire.

199. One fire-tub nearly filled with water is to be placed on the deck,

alongside the bottom of each shoot for returning empty boxes. The top of this tub is to be provided with a stout hoop to ship and unship, with a grating of stout copper wire, the meshes of which are to be made small enough to prevent the passing-box from falling into the water, in case of slipping from the man's hand while being struck over the tub.

SHOT AND SHELL.

200. Shot and shell are to be passed up by hand, or whipped up, by the most convenient hatchways. The hands stationed below at the lockers are to work the whips, each of which being fitted with a toggle, will indicate when the projectiles are hoisted high enough. In case a shot-locker should be somewhat removed from the hatchway, up which the shot are to be passed or whipped, the shot may be speedily conveyed over the distance by means of a wooden trough fitted for the purpose.

HATCHWAY FOR THE WOUNDED.

201. One hatchway, or portion of a hatchway, and that as nearly amidships as possible, is to be reserved for lowering the wounded below, and to be properly provided with a cot or cots, having a whip to each.

NAVAL GUN CARRIAGES.

202. All gun carriages and their equipments are to be made in conformity with directions from the Bureau of Ordnance.

NOMENCLATURE OF ORDINARY NAVAL TRUCK CARRIAGE.

WOODEN PARTS.

Carriage.

A. Brackets of large carriages are made each of two pieces, joined by a jog *a*, and dowelled. The remaining parts of the backets are the trunnion holes *b*, steps *c*, quarter rounds *d*, and arch *e*.
B. Transom, let into brackets.
C. Breast piece, in two parts; the inner part fixed, by two bolts, into transom; the outer part movable, connected by hinges:
D. Front and rear axletrees, consisting each of square body *f*, and arms *g*, jogged into brackets.
E. Front and rear trucks.
F. Dumb trucks.
G. Bed and stool.
H. Quoin.

Implements.

I. Handspikes.
K. Chocking quoin.

METAL PARTS.

Carriage.

1. Two cap squares.
2. Four cap-square bolts and two keys and chains.
3. Two bracket bolts.
4. Two rear axletree bolts.
5. Two side-tackle eye-bolts.
6. One train-tackle eye-bolt.
7. One transporting eye-bolt.
8. Two breast bolts.
9. Two hinges of breast pieces.
10. Two transom bolts, (upper and lower.)
11. Two breeching side-shackles and pins.
12. Bed bolt.
13. Four axletree bands.
14. Chafing plates of steps and brackets.
15. Four linchpins and washers.
16. Quoin-plate and stop.
17. Ratchet for quoin stop.
18. Four training loops.
19. Breeching thimble, (cast iron.)
20. Side-shackle bolts for breechings.
21. Shackle pin, plates, and keys.
22. Two axle stays.
23. Handspike shoe.

NOMENCLATURE OF PARTS PECULIAR TO VAN BRUNT'S FRICTION CARRIAGE FOR LIGHT GUNS.

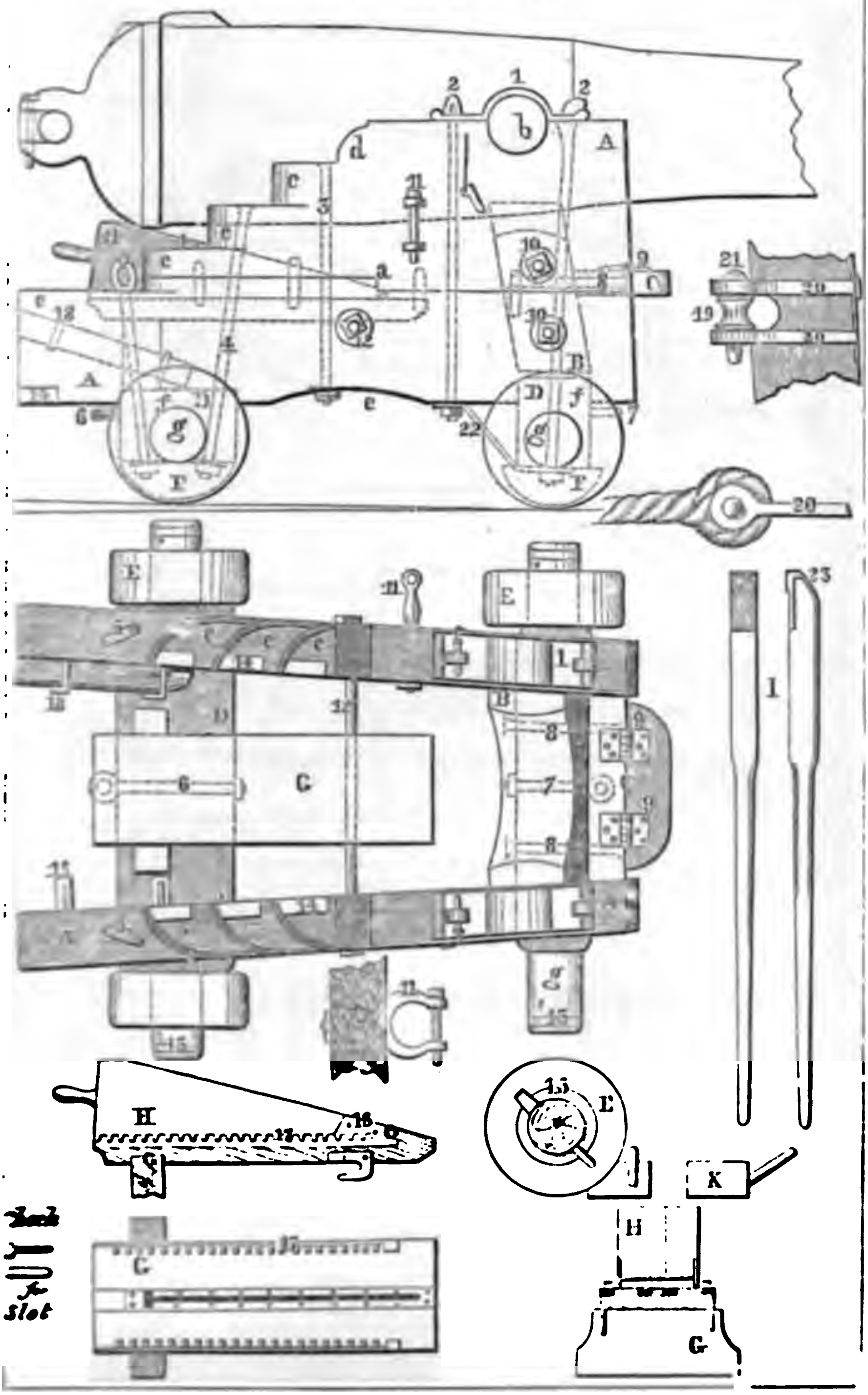
OF CARRIAGE.

203. A, middle transom; B, rear transom. Compressor, composed of eccentric axle *a*, with catch *b*; journals *c c*; levers *d d*; spring catch for do. *e*; compressor blocks *f f*, and clamps *g g*. Trucks D, attached to brackets by brass box and axles; and elevating screw E, (Hart's,) with levers, attached to rear transom.

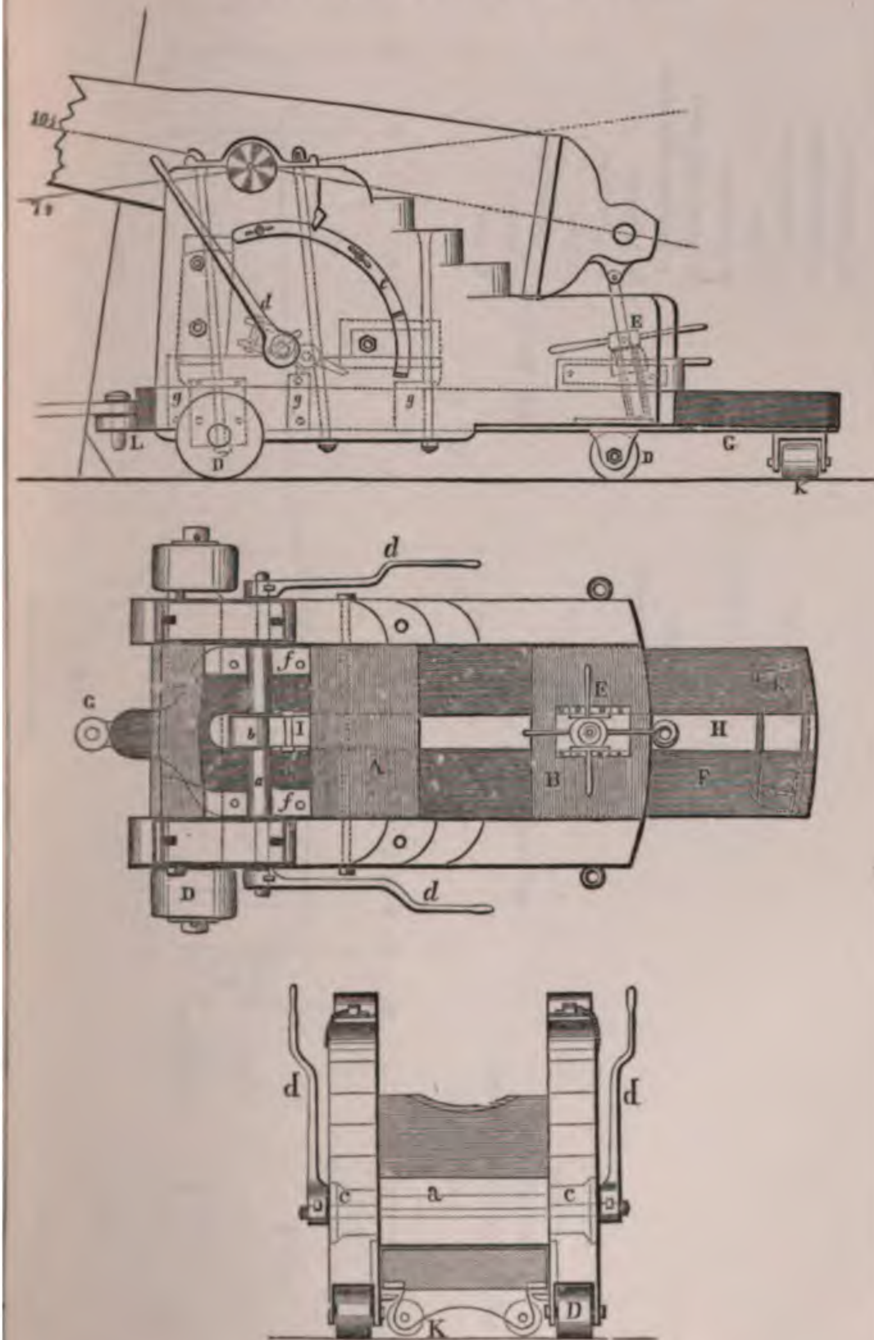
OF SLIDE.

F, Compressor plates, under slide, with nose-piece and pivot-hole G. Slot H, with catch-stop I. Training trucks K, attached by brass box. Pivot-bolt, loop, and socket L.

Naval Truck Carriage.



Vanbrunt's Friction Carriage for Light Guns.



Nomenclature.

Fig. 1.

SHOT GUNS

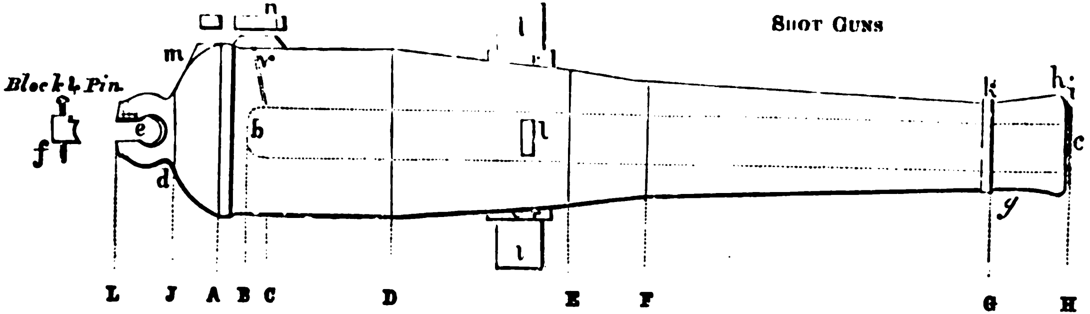


Fig. 2.

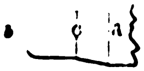
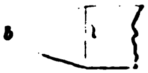


Fig. 3.



SHELL GUNS.

Fig. 2. Cylindrical Chamber.
ba. *Chamber.*
ca. *Slope.*

Fig. 3. **ba.** *Gomer Chamber.*

Fig. 1.

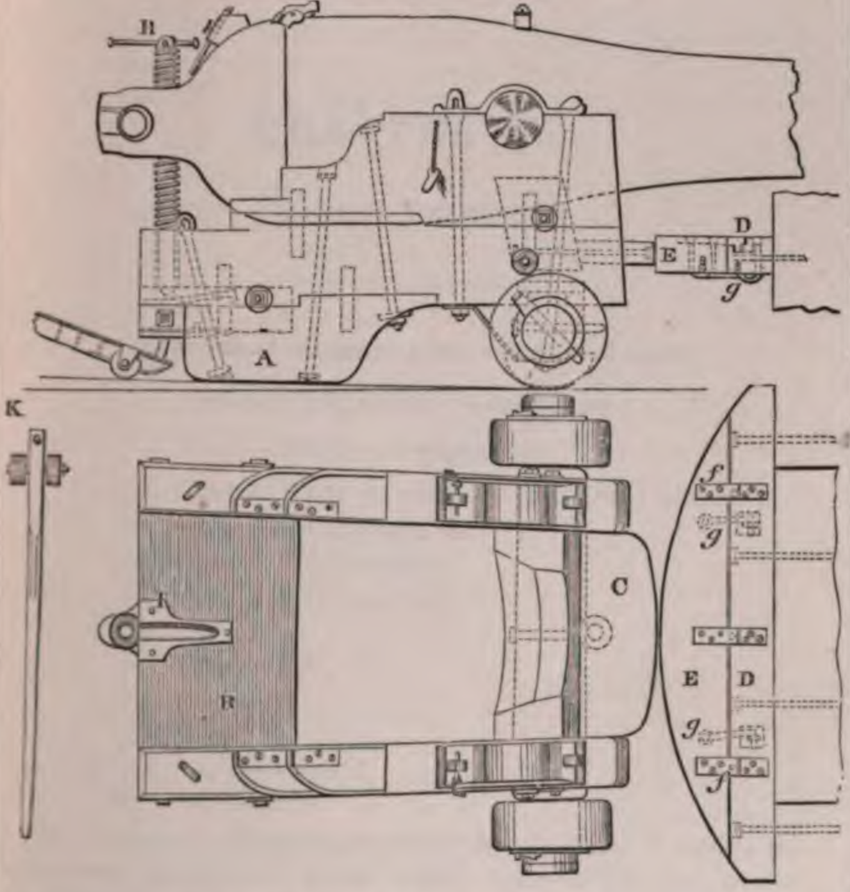
AL. *Cascabel.*
- **AJ.** *Base of breech.*
- **d** *Neck.*
- **e.** *Jaws.*
- **f.** *Block and pin.*

AB. *Breech.*
AC. *Curve of base-ring.*
BD *1st Reinforce.*
DE. *2d do.*
EF. *Curve of Reinforce.*
FG. *Chase.*
AH. *Length of Gun.*

GH *Muzzle.*
- **g.** *Neck.*
- **h.** *Swell.*
- **i.** *Lip and fillet.*
- **c.** *Face.*

tt. *Trunnions.*
rr. *Rimbases.*
l. *Reinforce sight mass.*
m. *Breech-sight mass.*
n. *Lock piece.*
v. *Vent.*
bc. *Length of bore.*
b. *Bottom of bore.*
k. *Chase ring.*

Marsilly Carriage for IX-Inch Shell Gun.



NOMENCLATURE OF PARTS PECULIAR TO—

A. *The lowest piece of the Bracket, in place of rear truck of ordinary Carriage.*
B. *Rear Transom, in place of rear axle.*
C. *Breast-piece (fixed.)*
D. E. *Sweep-pieces.*
D. *Fixed below the Port-sill.*
E. *Movable, with brass catches (f. f.) and hooks and eyes (g. g.)*
H. *Elevating screw and lever, with saucer (I), in place of bed and quoin.*
K. *Roller Handspike.*
L. *Loop for Handspike*

CHAPTER IV.

MANUAL EXERCISE.

EXERCISE OF BROADSIDE GUNS, ON ONE SIDE ONLY.

IX-INCH SHELL-GUN, *(as an example.)*

204 WORDS OF COMMAND.

1st. SILENCE! "MAN THE STARBOARD (*or Port*) GUNS!"
2d. "CAST LOOSE AND PROVIDE!"
3d. "RUN IN!" (preparatory.)
4th. "SERVE VENT AND SPONGE!"
5th. "LOAD!"
6th. "RUN OUT!"
7th. "PRIME!"
8th. "AIM!"
9th. "READY—FIRE!"
10th. "SECURE!"

It is customary to keep the guns of the Battery loaded at sea; it has been found that the fire of a ship could be commenced in three minutes from the beat of drum, the guns being secured for sea and no notice of what was contemplated announced to men or officers save by the signal for quarters.

This form of exercise therefore proceeds on the assumption that the cannon are not loaded, but the order of the commands may be varied to suit the circumstances of the case.

Guns should never remain loaded longer than necessary, as the cartridge speedily deteriorates by the effects of moisture. If a shell has been loaded twenty-four hours it should be drawn and refuzed.

NOTE.—In order not to encumber the text with details, they are transferred to the "Notes on the Manual Exercise," (*art.* 288 *to* 357,) which are to be carefully studied. Also the notes to Pivot Gun Exercise.

1. "SILENCE! MAN THE STARBOARD *(or port)* GUNS!"

205. At this preparatory order the strictest silence is to be observed. The Captain faces the port, the men, on the right and left, stand facing the gun; all fix their eyes on the Captain and attentively wait for orders.

2. "CAST LOOSE AND PROVIDE!"

206. The **1st Captain** commands, sees his gun cleared and cast loose, portlid unbarred ready for tricing up, or half ports taken out; side and traintackles hooked, the sidetackle to the side training bolt, and the traintackle to the eye bolt in the deck in the rear of the gun; casts loose and middles breeching and places selvagee straps and toggles amidships; takes off lock cover and hands it to the train-tackleman, who places it amidships; buckles on his waist-belt, (*furnished as directed in article* 150;) provides himself with a priming wire; puts on and secures his thumbstall; and sees that the gear and implements for the service of the gun are all in place and ready for use, and that the men are properly equipped.

When the gun is ready for action he sees that the men take their proper positions, and reports to the Officer of the sub-division to which he belongs.

207. **2d Captain** assists in casting loose and middling breeching; takes off and places amidships sight covers, selvagee straps, and toggles; handles quoin; provides thumbstalls, priming wires, and boring-bit, and equips himself with the first two; clears lock-string and lays it in a loose coil round the lock, convenient for use, and buckles on his waist-belt, furnished as 1st Captain's. At Friction Carriages he removes the housing chocks. If the gun is furnished with an elevating screw, elevate the gun, that the lower half port may be let down.

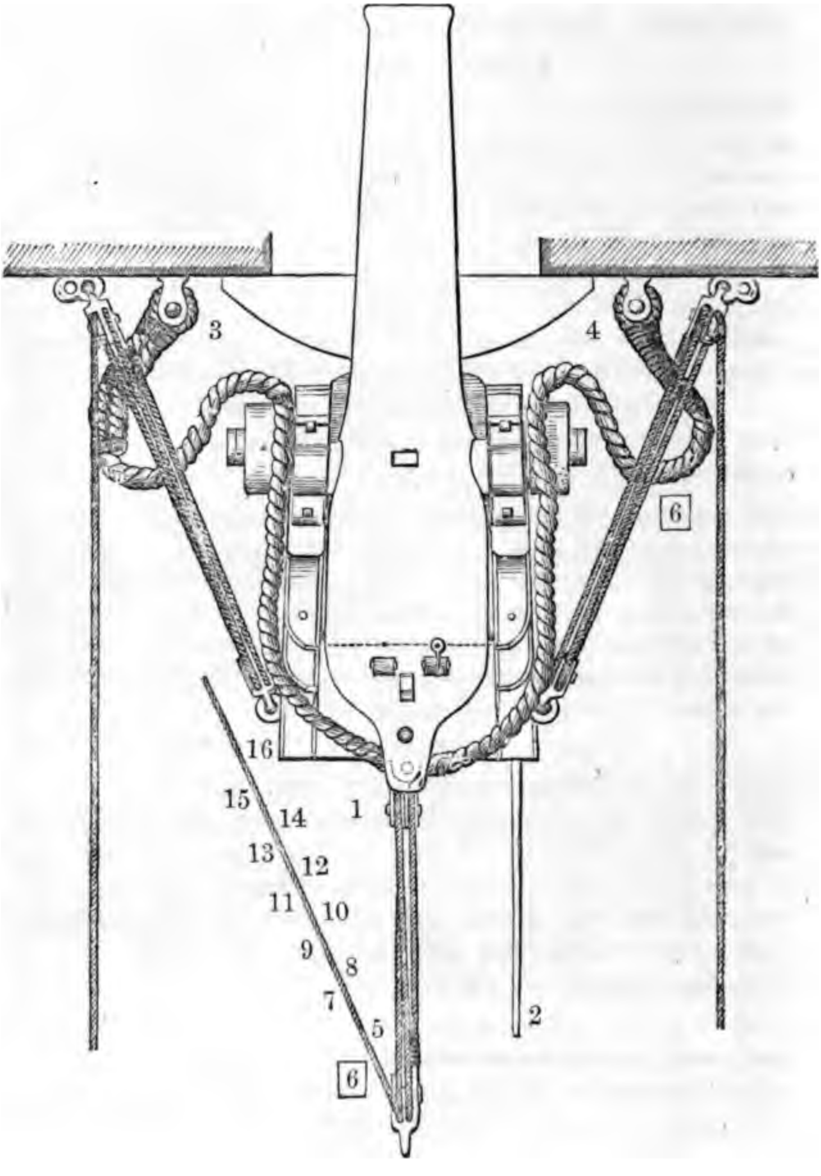
208. **1st Loader**, aided by 1st Sponger, casts loose port-laniards, removes upper half port, and passes it to the men on the left side of the gun, who lay it amidships; lets down the lower half port. On *lower deck* casts off port-laniards and muzzle-lashing; removes port-bar and passes it to the men at the left side of the gun, who lay it amidships; bears out port. On all decks places hand swab and chocking quoin near the ship's side on the left side of the gun; aids 1st Sponger in taking out tompion.

209. **2d Loader** assists in casting loose; sees the wads in place; hooks double block of sidetackle to side training bolt, on the left side of the gun; and at *Friction Carriages* sees the compressor clear and in working order.

210. **1st Sponger** casts loose port-laniards and aids 1st Loader in removing upper half ports and letting down lower ones, and on lower

RUN—IN.

[Diagram No. 1.]



decks in removing the port bar, bearing out the port and taking off the muzzle-lashings; takes out tompion and passes it to 2d Sponger, who hangs it amidships; places chocking quoin on the right side of the gun, near the ship's side.

211. **2D SPONGER** assists in casting loose; hooks double block of side tackle to the side training bolt, on the right side of the gun. At Friction Carriages, where there are two compressor bars, attends right compressor bar.

The Spongers take down the sponges and rammers; take off the sponge cap and hang it up out of the way; place sponges and rammers together, on the right side of the gun, heads toward the breech, in the brackets overhead on covered decks, otherwise on deck.

The **SIDE-TACKLEMEN** assist in casting loose; on lower decks, aid Port-tacklemen.

212. **SHELLMEN** assist in casting loose, provide shot and wads, and proceed to hatchway, ready to pass loaded shell, if ordered.

213. **TRAIN-TACKLEMEN** lead out and hook train-tackle.

214. **HANDSPIKEMEN** take out the handspikes on their respective sides, and with carriages using a quoin, each standing between his handspike and the side of the ship, place the heels of their handspikes on the steps of the carriage and under the breech of the gun, and raise it so that the quoin may be eased and the lower half port let down, or, when housed, the bed and quoin adjusted. Then each Handspikeman will lay his handspike on deck, on his own side of the gun, parallel with its axis, clear of the trucks and butt to the rear.

215. **POWDERBOY** repairs to his proper scuttle for his passing-box, which having received he returns and stands a little to the left and in rear of the gun, keeping the passing-box under his left arm and the cover closely pressed down with his right hand.

216. When there are *fourteen or more* men at a gun, the **PORT-TACKLEMEN** and **SIDE-TACKLEMEN**, on lower decks, lead out port-tackle falls and assist in tricing up the port, and, when high enough, belay the fall.

217. In the temporary absence of the first Captains, Loaders, or Spongers, *when at quarters on one side*, their Seconds will take their places and perform their respective duties.

218. With a gun's crew of *ten* or *more* men, No. 7 will take the place of No. 5, and No. 8 of No. 6, when Nos. 5 or 6 are absent temporarily.

"III. RUN IN," (*preparatory.*)

(Diagram No. 1.)

219. Nos. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, (and, if necessary, 5, 6,) man the Train tackle.

2d Captain ships and works Roller Handspike. Nos. 3, 4 overhaul or tend the Side tackles.

The gun having been run in, No. 12 chokes luff of Train-tackle, assisted, if there is much motion, by No. 11.

Nos. 3, 4 place Truck-quoins in front of Trucks.

No. 6, with back square to gun, and facing over left shoulder to Sponger, takes up the Sponge, head inboard, and stands ready to hand it to 4.

No. 8, facing to the gun, and outside of 6, does the same with the Rammer.

The rest of the men go to their stations.

IV. "SERVE THE VENT AND SPONGE."*

(Diagram No. 2.)

220. No. 4 receives the moist Sponge from 6, right hand over, left under, sends it home, and, assisted by 3, presses it to bottom of bore; then, turning it round two or three times in the direction which is needed to have the worm take, withdraws it, and, when out, strikes the staff several smart taps under the muzzle, then hands it back to 6, who lays it on the deck or lodges it overhead on the hooks, if they are provided. No. 10 examines and clears sponge head and worm.

Gun Captain stops the Vent, and after the Sponge is withdrawn serves the vent with his priming wire and again closes it.

No. 8 hands Rammer to 4 as soon as the Sponge is taken from him by 6. Should 4 observe that the Gun Captain neglected to serve the vent he is to call his attention to it.

No. 3 stands ready with Charge he has taken from Powder-man.

No. 5, assisted by Shell man, opens Shell-box, disengages the Shell, and has it in readiness to pass to No. 3.

V. "LOAD."

(Diagram No. 2.)

221. No. 3 places Charge in muzzle, seam from the Vent, small end in, and pushes it well into the Bore.

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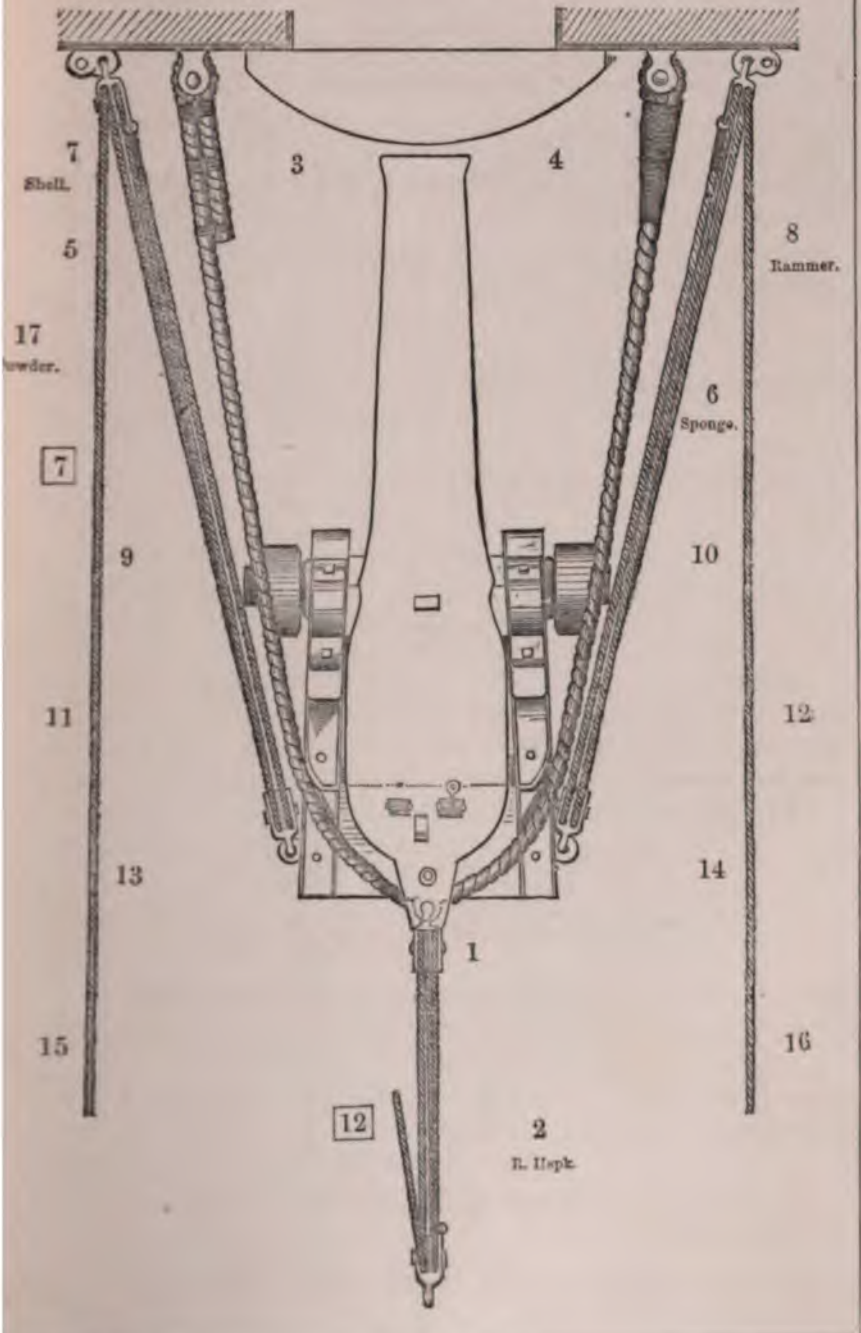
*See notes on this command and the succeeding one, "LOAD," for further important details.

SPONGE—LOAD.

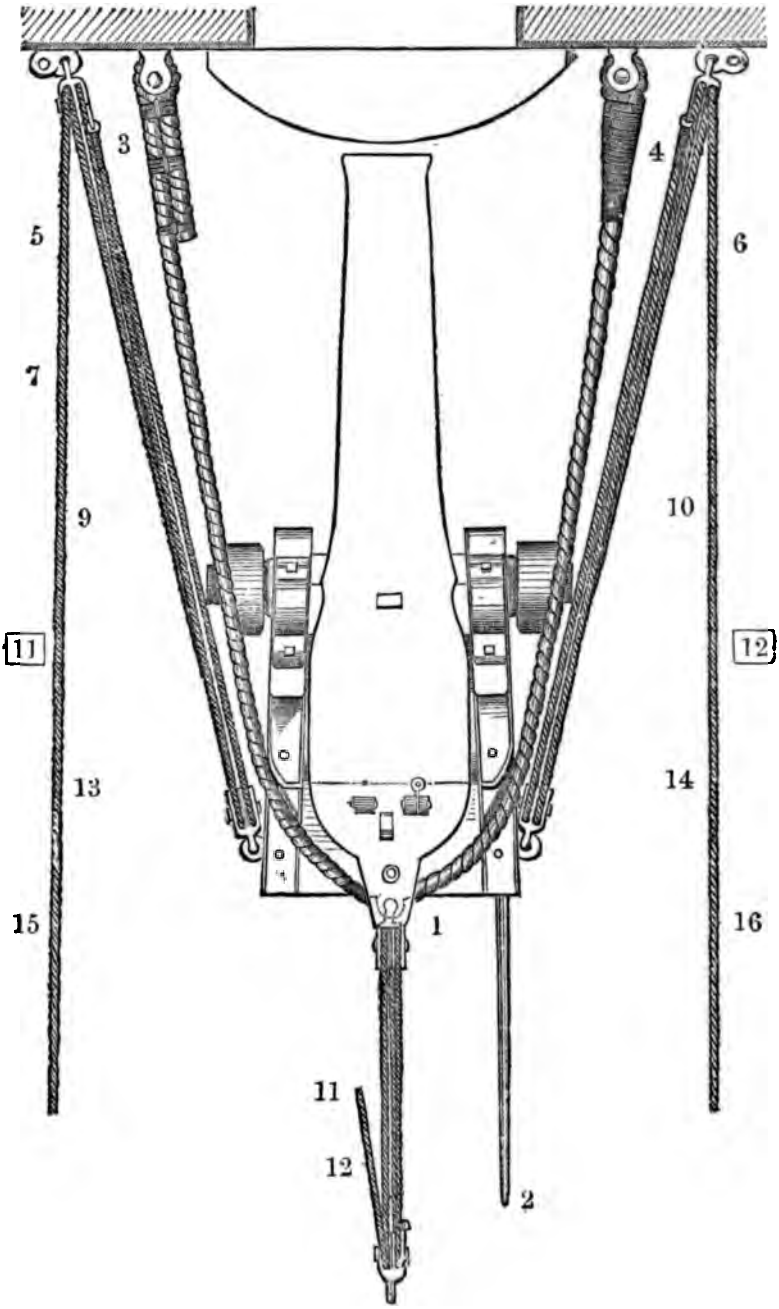
[Diagram No. 2.]



RUN—OUT.

(TO LEEWARD.)

[Diagram No. 3.]



No. 4 stands ready with the Rammer, enters it into the muzzle and pushes the Charge steadily to the bottom of the Bore, which will be shown by the mark on the rammer handle; 3 assists with one hand, and the charge is *on no account to be struck.*

While 4 withdraws the Rammer, 3 is to receive the Shell from 5, lift and enter it, sabot first, into muzzle, fuze out, as soon as the rammer is clear thereof.

As the shell lies just fair with muzzle, 3 removes cap from Fuze, which is to be passed along to the Gun Captain, and pushes the Shell into the Bore.

No. 4 enters Rammer, and, assisted by 3, pushes in the Shell until the mark on handle shows it to be in place. It is most strictly forbidden to strike the Shell with the Rammer.

No. 6 takes Rammer from 4 and lays it down.

Whilst this has been doing, the preparation for the next order has been proceeding, thus:

2d Captain ships Roller Handspike. Nos. 7, 9, 11, 13, 15,—8, 10, 12, 14, 16 take hold of Side-tackles; Gun Captain feels if Vent is clear.

Action.

Nos. 5, 6 assist at Side-tackles.

Nos. 3, 4 attend Truck quoins and keep the Breeching clear of Fore-trucks.

No. 12, assisted in heavy rolling of lee guns by 11, prepares to tend Train-tackle. If necessary with a round turn round all parts of the fall.

VI. "RUN OUT"

(Diagram No. 3.)

222. The execution of this order is to be controlled by the gun being to windward or to leeward, and also by the nature of the Roll.

To *leeward*, and with much motion, the cannon will rush out violently unless prevented; therefore 11 assists 12 at the Train-tackle; 7, 9, 11, 13, 15, and 8, 10, 12, 14, 16 start the gun cautiously.

2d Captain heaves up on Roller-handspike, but is careful to let down the Carriage if it begins to start out rapidly; it may even be advisable not to use the Roller handspike at all.

Nos. 3, 4 remove truck quoins and tend breeching.

Action.

If to *windward*, 2d Captain heaves up Carriage fully on Roller-handspike.

Nos. 5 and 6 assist at Side-tackles.

No. 12 only tends Train-tackle if the Roll should need it; otherwise he overhauls it and assists at Side-tackles.

Nos. 3, 4 remove Truck quoins, and keep Breeching from fouling the Fore-trucks; 7, 9, 11, 13, 15, and 8, 10, 12, 14, 16 set taut the Side-tackles.

When the gun is out the 2d Captain swivels the Roller-handspike for training, or removes it altogether if the Handspike alone be preferred for this operation.

Nos. 5, 6 choke luffs of Side-tackles, while 3, 4 place Truck-quoins in rear of trucks, if the movement of the ship requires it.

If the training is to be sharp, the proper Side-tackle will be hooked to the further eye-bolt inside; 12 unhooks the Train-tackle, and hooks it also to the proper eye-bolt in deck.

VII. "PRIME."

(Diagram No. 4.)

223. Gun Captain again *makes sure* that the Vent is clear, and, in *so doing*, lets down his wire quickly into the charge.

He inserts a Primer, and turns down the Hammer upon it.

Meanwhile 9, 10 take up handspikes and place themselves at rear of bracket conveniently to heave forward or aft.

In sharp training Nos. 13, 14 assist them.

Nos. 3, 5, 7, 11, 13, 15, and 4, 6, 8, 12, 14, 16 man Side-tackles.

VIII. "AIM."

(Diagram No. 4.)

224. Gun Captain adjusts or verifies Sliding Bar of Rear Sight to proper distance given by the Officer of Division, and falls back so as to be clear of the recoil, laniard in hand, face to the Port, standing *directly in the rear of the gun*, with his eye ranging over the sights, and keeping in view the water-line of the opposing ship, trains the gun by voice or sign.

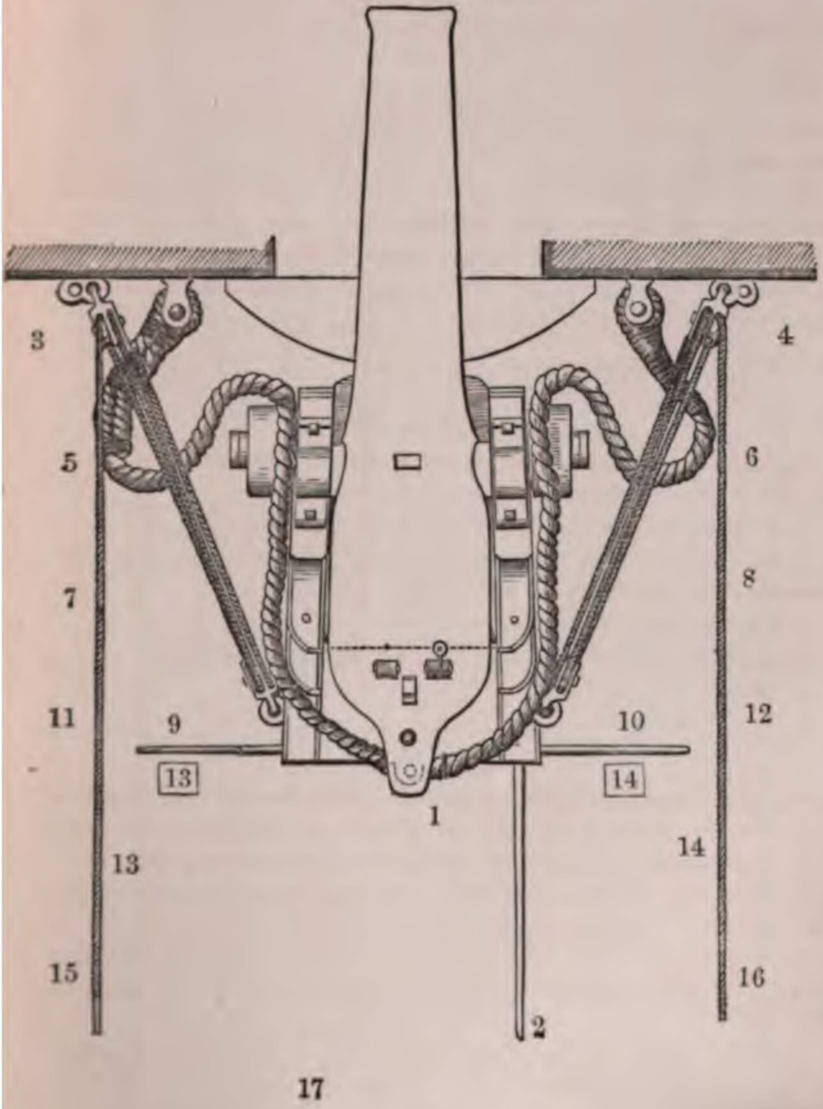
No. 6 throws back the Hammer, and takes hold of lever of Elevating Screw. (If Roller-handspike is not used in training, 2d Captain performs this.)

At word "Muzzle to right" or "left," 3, 5, 7, 11, 13, 15, or 4, 6, 8, 12, 14, 16 haul on the proper Side-tackle, and 9, 10 heave correspondingly on handspikes. Nos. 3 and 4 keep their eyes on handspikemen opposite to them, to give the time to the other Nos. for hauling on the fall.

No. 6 (or 2d Captain) Elevates or Depresses as directed.

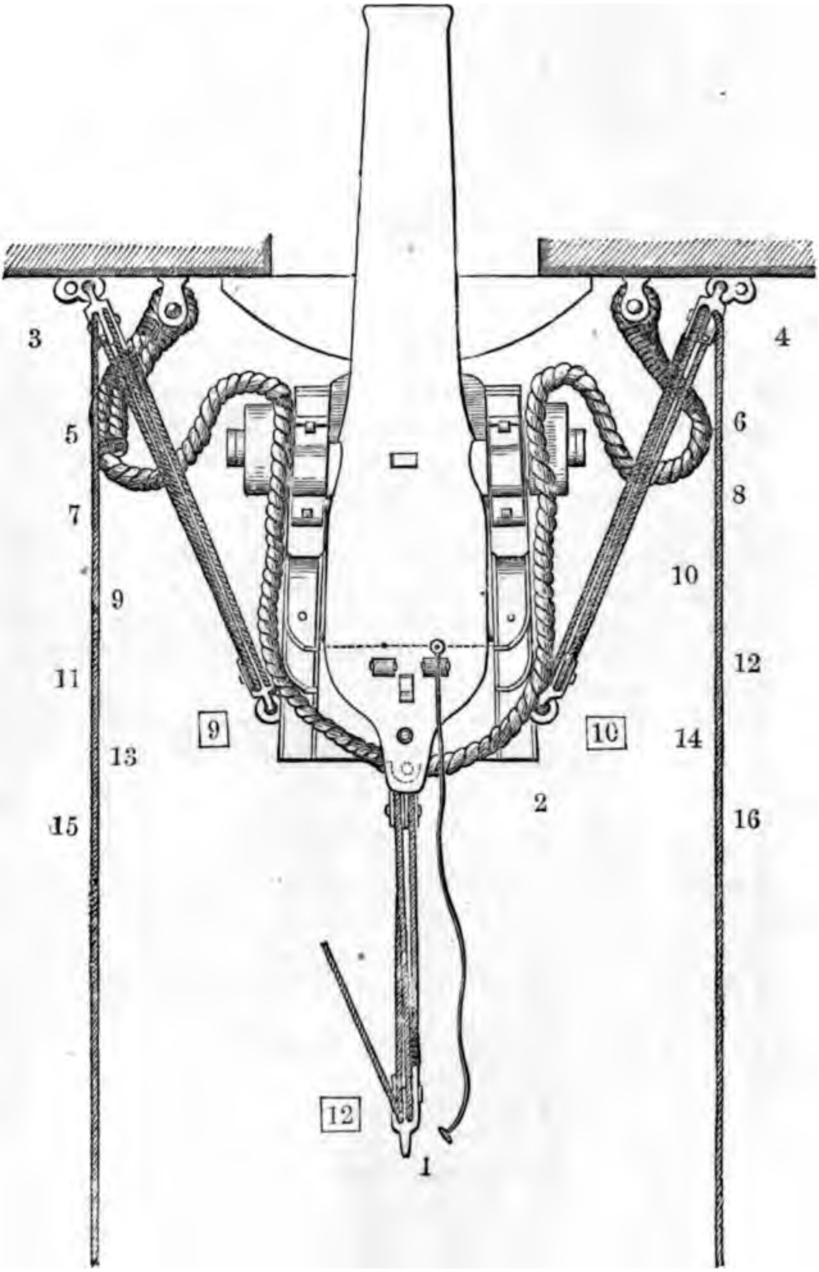
PRIME—AIM.

[Diagram No. 4.]



READY—FIRE.

[Diagram No. 5.]



Action.

2d Captain unships the Roller Handspike if it has been used in training. 9, 10 lay down handspikes.

Nos. 3, 4 overhaul Side-tackles *to mark,* unless the motion does not admit of it.

No. 12 overhauls or holds up Train-tackle.

Nos. 7, 8 remove quoins from Trucks.

Men to their stations.

IX. "READY—FIRE."

(Diagram No. 5.)

225. The Gun Captain, standing as already placed, waits patiently, but sharply, for the coincidence of the sights upon the object, which, if a ship, *is always the water-line.* When a correction of elevation or of direction is required, he repeats such of the previous orders as may be required; and these are to be re-executed accordingly.

If the gun is to leeward, the men stand ready to take hold of the Train-tackle and jerk the cannon into a taut breeching.

When sure of his aim the Gun Captain, who has held the lock laniard *just* taut, draws it promptly and firmly, bearing in mind that in no case is he to attempt moving from his post.

The 2d Captain stands ready with a primer, and, in the case of failure, throws back the hammer and inserts another. If necessary, serves the Vent.

Action.

Instantly with the explosion, 11, 12 jerk away the parts of the train-tackle, or hook it if it has been unhooked.

Nos. 3, 4 place quoins in front of trucks.

When the gun is not in to a taut breeching, the 2d Captain ships the roller-handspike.

Nos. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, take hold quickly of train-tackle, and run in to a taut breeching.

When in, 3, 4 move up the Truck-quoins, 12 chokes luff of Train-tackle.

Gun Captain puts back the hammer and coils up laniard.

No. 6 takes up Sponge, and the exercise proceeds as already directed.

If necessary, No. 2 levels the gun for loading, and lays it fair for running out

226. N. B. The breechings of IX-in. guns are to be so fitted that the face of muzzle when in shall be 18 inches from inner face of side, for two reasons:

To prevent the gun from returning to the port, and to give room for the handling of such large shells.

17 men are a proper number for working a IX-in. under any circumstances.

Rammer handles are to be marked for place of charge and of shell.

Side and train-tackles are also to be marked to the proper overhaul, so as to avoid slack rope.

Breast sweeps are useful at lower sill of port, for training more than a point.

X "SECURE!"

227. The Powderboy returns the spare powder and the passing-boxes to the magazine. The Shellmen return the shells and empty shell-boxes, if any remain on deck, to the shell room.

The 1st Captain directs the gun to be laid square in the middle of the port.

When the guns are to be secured without being housed the 1st Loader and 1st Sponger place the chocking-quoins square up against the rear part of the front trucks and put in the tompion. The Handspikemen, if there is a quoin, free the quoin and lower the breech, the 2d Captain handling the quoin. When the gun is fitted with an elevating screw this operation is performed by the 2d Captain alone, who handles the screw.

The 1st Captain, assisted by the 2d Captain, hauls the breeching through the jaws of the cascable to the left side of the gun, forming with the bight a turn over the breech and 1st reinforce, taking care to keep the breeching well clear of the elevating screw to prevent chafe, and securing the parts on each side with selvagees and heavers; or, if this should interfere with the breech-sight, by crossing the breeching at the side and securing it with selvagee straps and toggles.

The 1st Loader and 1st Sponger haul up and secure the lower half-ports. The 1st Captain puts in the vent plug, lays the hammer of the lock in its place, and the lock-string in a coil around it. The 2d Captain takes the lock-cover from the Train-tackleman and secures it over the lock, and in like manner covers the breech and reinforce sights; [and at Friction Carriages puts the housing-chock into the slot in the rear of the gun, and raises the training trucks clear of the deck, by means of a chock under the slide.]

The men at the side-tackles unhook the double blocks from the side training bolts and hand them to the 1st Loader and 1st Sponger, who hook them to the eye-bolts at the sides of the port. The men on both sides haul them taut and stop the parts of the tackles together, with knittles provided by the Quarter Gunner, and then expend the remainder of the falls by passing them around the breech of the gun, above the jaws of the cascable, and stopping the bights alternately to the eye-bolts* on each side of the port until expended.

The Train-tacklemen hook the train-tackle to the side-tackle bolts on each side of the port, the double block on the left side, haul the tackle taut, expend the end round the breech, and stop the parts in with the side-tackles.

The 1st Captain then directs the Handspikemen, or if the screw is used, the 2d Captain, to raise the breech so as to level the gun and bring all parts of the tackles and breeching taut.

The 1st Loader and 1st Sponger put in and secure the upper half-ports, if directed, and the 1st Loader swabs the deck to collect any loose powder which may have been scattered on it.

The several persons who provided the arms and implements used in the exercise, return them to their proper places, or to the persons appointed to take charge of them, care being taken that the small arms are unloaded before they are sent below, unless otherwise directed by the Captain.

HOUSING LOWER-DECK GUNS.

228. *If the lower-deck guns are to be housed,* the 1st Captain directs the gun to be laid square in the middle of the port and run it to a taut breeching, *and if loaded, the load to be drawn.* The 1st Loader and 1st Sponger place the housing-chocks before the front trucks.

The gun is then run close up against the housing-chocks, and the chocking-quoins are placed square up behind the rear trucks.

The Handspikemen raise the breech to free the quoin; the 2d Captain withdraws it and the bed; the Handspikemen lower the breech upon the axletree, so that in case the gun should break adrift, the muzzle will take the upper port sill; and the Port-tacklemen lower the port-lid.

The 2d Loader and 1st Shellman bring the port bar to the 1st Loader and 1st Sponger, who put it in place across the port, hook the port-hooks in the ring-bolts in the port-lids, and drive in the keys until the port is perfectly closed.

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* Should hook-bolts be substituted for the eye-bolts now in use for the side-tackles, as vessels are built or repaired, the turns of the fall will be taken round the hooks in securing the gun.

The men on both sides shift the side-tackles from the training bolts to the side-tackle bolts, haul them taut and expend the ends between the blocks. The 1st Loader and 1st Sponger pass the frapping lashing round both parts of the breeching, in front of the brackets, and with the assistance of the men nearest them bowse it well taut; and secure the muzzle by placing the grommet over it and the housing hook-bolt, and by frapping the two parts together with the lashing. When the housing bolt is an eye-bolt, a toggle will be necessary to keep the grommet in its place.

In moderate weather the train-tackle is unhooked from the deck, and made up and stopped along the side-tackle, on the forward side of the gun. In bad weather it is kept hooked, bowsed taut, and the end expended through the ring-bolt and round the arms of the rear axle.

The manner of housing guns, mounted on truck carriages, on other decks, in bad weather, does not vary materially from that just described, excepting that the upper half-ports and the *port bucklers* are put in and secured.

When there are no housing chocks the ordinary chocking-quoins may be used as such. It will be an additional security to take off the rear trucks, and to tighten the muzzle lashing by raising the breech.

In housing broadside guns mounted on *Friction Carriages*, the gun is first run in and the housing-chock dropped into the slot in front of the gun, which is then run out hard upon the chock and the compressor tightened. The gun and implements are secured as at other guns, the training trucks being raised clear of the deck by means of a chock under the slide.

GENERAL REMARKS.

229. When the individuals of the guns' crews have become well acquainted with, and expert in the performance of their several special duties, they are to be successively transferred, temporarily, to the performance of the duties of some other station, until each man shall have become acquainted with the special duties of every station at the gun.

In exercising each man of a gun's crew in the duties of all the other men of that crew besides his own, it is to be done thus:

The system supposes that, beginning with the 2d Captain to take the place of the 1st Captain, the men are to be called to perform the duties of the latter in a regular succession agreeably to the way they are placed at the gun; *i. e.*, after the 2d Captain the 2d Handspikeman is to do the duties of 1st Captain; after the 2d Handspikeman, the 2d Train-tackleman, and so on all round the gun. Each man is to fleet his position one remove or place, in a direction "with the sun," so that instead of the interchange of duties being confined to two individuals only, it is to extend to the whole gun's crew. Thus, for instance, when the 2d Captain is called upon to do the duties of 1st Captain, the latter, by moving one place "with the sun," becomes the 1st Handspikeman, the 1st Handspikeman becomes the 1st Train-tackleman, the 1st Train-tackleman the 1st Port-tackleman, and so on all around the gun throughout the whole crew, the person at the muzzle of the gun on its left side crossing over and taking the place of the one at the muzzle on the right side. Next in order, the 2d Handspikeman is required to take the place of the 1st Captain, then the 2d Captain becomes 1st Handspikeman, the 1st Captain the 1st Train-tackleman, the 2d Train-tackleman the 2d Captain, and so on throughout. (*See Shifting Diagram.*)

If it should be desired to take, at first, a man from the middle of the crew of the gun, or even still further towards the muzzle, to do the duties of 1st Captain, then it must be done under the supposition that all the men preceding him in the order above mentioned have already been exercised in those duties, and the men are then to take their stands accordingly.

After the guns' crews have been well trained by giving the words of command, it will be expedient to exercise them without giving the several detailed commands, by directing them to "load and fire!" At this command the different individuals should, each in proper order of time, silently perform his prescribed duties of sponging, loading, running out, training, and pointing, the Captain of the gun regulating the elevation and depression, by raising or lowering his hand, and by holding it horizontally and steady when the gun is "well;" and in pointing, by moving his hand to "right" or "left" as the gun requires to be trained, and by bringing it down to his side when it is "well." Before firing, he is to throw his hand well up as a signal for the men to "drop tackles," and is to give the word "fire" when he pulls the lockstring.

When casualties occur at the guns, the Captain of the gun will order "close up," and then equalize the crew on each side. If the Powderman is disabled the highest number takes his place.

230. Whenever the crew of a gun becomes so greatly reduced in action that men enough are not left to work the piece, it may be fired while partially run in. In such case, however, the breeching should be frapped forward of the carriage, or otherwise arranged so as to keep the muzzle outside of the port; the side-tackles should be hauled well taut and secured; the chocking-quoins placed square up against the after part of the rear trucks; the train-tackle hauled taut and well secured, and wet swabs placed up against the forward part of the front trucks and sprinkled with sand or

ashes. The greatest possible care should be taken to guard against accident from fire, and minimum charges of powder used.

It must be apparent to every officer that both the rapidity and the accuracy of fire to be obtained from guns in vessels at sea must depend, in a great degree, upon the care which may be taken to explain to the men the best mode of performing their respective parts of the exercise, and the particular object for which each part is intended, and especially on such frequency of exercise and target firing as will make the men perfectly familiar with their prescribed duties. The importance of this instruction, which may decide whether an action shall result in victory or defeat, will, it is hoped, insure due attention to it from all officers, and especially from the officers of divisions at quarters.

THE GUNS ON ONE SIDE BEING MANNED,

TO CHANGE SIDES,

OR BOTH SIDES BEING MANNED,

TO MAN ONE SIDE ONLY;

COMMAND.

"MAN THE STARBOARD (OR PORT) GUNS!"

231. Whenever this or any other order is given which requires all the men suddenly to leave the gun which they are working, they are not to do so until it is properly loaded, and well secured by hauling taut the side and train tackles, and hitching their falls around the straps of the single blocks; nor on lower decks of ships-of-the-line till the ports are down and secured by their laniards. A strict compliance with this injunction is indispensable to guard against excessive or imperfect loading and other accidents.

When these precautions have been duly taken, the men will shift over in obedience to the command.

EXERCISE OF BROADSIDE GUNS

ON BOTH SIDES AT ONCE BY MANNING ALTERNATE GUNS WITH FULL CREWS.

In the event of being required to fight both sides, it is generally conceded that a more effective fire is maintained by handling alternate guns with full crews.

In this case the preparatory order will be given:

"SILENCE! MAN BOTH SIDES, EVERY OTHER GUN WITH FULL CREWS."

Upon which the guns' crews of the guns of the *starboard watch* will man the *odd numbered* guns on the *starboard* side, and the guns' crews of the *port watch* will man the *even numbered* guns on the *port side*, and the exercise will be the same as prescribed for "broadside guns on one side only."

MANNING ALL THE GUNS.

GENERAL REMARKS.

232. The object of the following arrangement is to enable each gun's crew to work together and fire alternately a pair of guns on the same side of the deck. Experience, however, shows that this can only be continued with effect for three or four rounds.

When the after gun on a deck has an odd number, that and its opposite are to constitute a pair, and the crew is to be distributed between them and work them accordingly. (*See diagrams C and D.*)

233. *When the command is given to man both sides,* the guns' crews of the *starboard* watch will man the *starboard* guns, with their first parts at the *odd*, and their second parts at the *even* numbered guns; and the guns' crews of the *port* watch, the *port* guns, with their first parts at the *even*, and their second parts at the *odd* numbered guns.

234. *When the guns are cast loose and provided,* 1st and 2d Captains, Spongers, and Loaders are to remain at their respective guns, the "Shifting men" changing, at the order to do so, from one gun to the other of the pair. Captains, Loaders, and Spongers are to endeavor to load their respective guns, ready for running out, while the "Shifting men" are employed at the gun about to be fired. The same Powderboy is to supply both guns worked by the gun's crew to which he belongs.

235. Diagrams C and D exhibit the places of the men at the guns at the commencement of the exercise in working both sides at once.

The six permanent men of the gun's crew are distinguished by Arabic, and the "Shifting men" by Roman numerals.

Nos. 3 and 5, 4 and 6, assist at the side-tackles of their respective guns, while at their several stations.

236. If the gun's crew consist of 14 men, (*see diagram C,*) Nos. VIII, XIV, and X work the right, and XIII, XI, and IX the left side-tackles of their pair of guns.

No. XII attends train-tackle in running out and in, and No. VII passes shot and shell for his pair of guns.

237. If there be 16 men at a gun, the arrangement will be the same, with the addition that No. XVI works at the right and XV at the left side-tackle.

238. With a gun's crew of 10 men, (*see diagram D,*) Nos. VIII and X work the right, and No. IX, assisted by Nos. 1 or 2, the left side-tackles of their pair of guns.

No. VII supplies shot or shell, and No. X also attends the train-tackle, in running out and in, of his pair of guns.

239. With a gun's crew of 8 men, No. VII supplies shot or shell, and works at the left side-tackles, and No. VIII attends the train-tackles and works at the right side-tackles of the guns of their pair.

When little or no training is required the side-tackles should be hooked at the sides of the ports.

240. If there be but 6 men at a gun there can be no "Shifting men;" consequently, to man both sides, in this case, Marines or other available men must be taken to supply the deficiency.

241. At Friction Carriages the Loaders attend compressors. No. VIII attends the train-tackle of both guns of a pair.

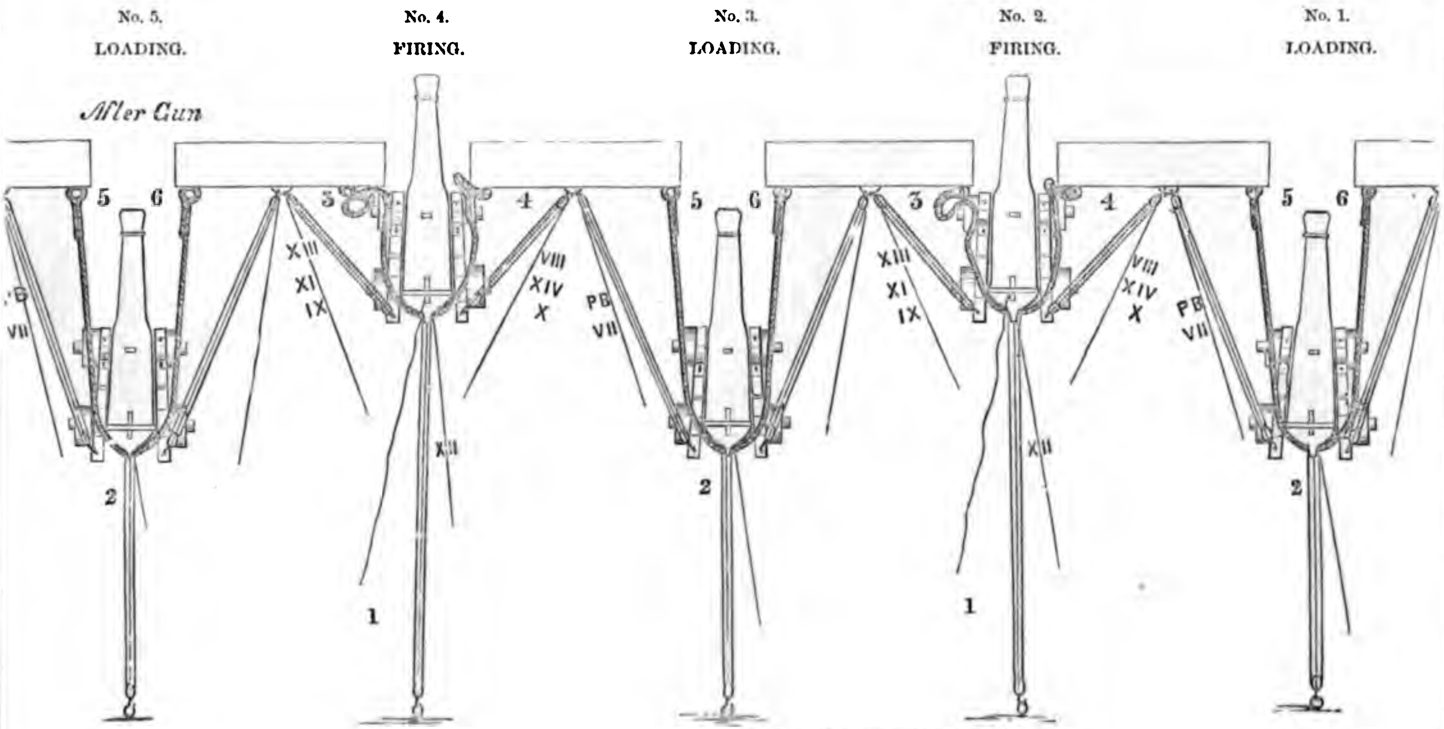
242. Luffs of side and train-tackles of all guns run in are to be choked, or hitched round straps of single-blocks, and chocking-quoins used when necessary.

243. In case the guns' crews should be so reduced, from any cause, as to render it impracticable to fight all the guns alternately, as just described, the remaining men must be concentrated so as to work *efficiently* as many guns as their numbers will permit.

244. The exercise begins under the supposition that the guns commanded by 1st Captains are loaded and run out, and those commanded by 2d Captains are run in and loaded. The orders are first addressed to the 1st Cap-

Fighting both Sides.

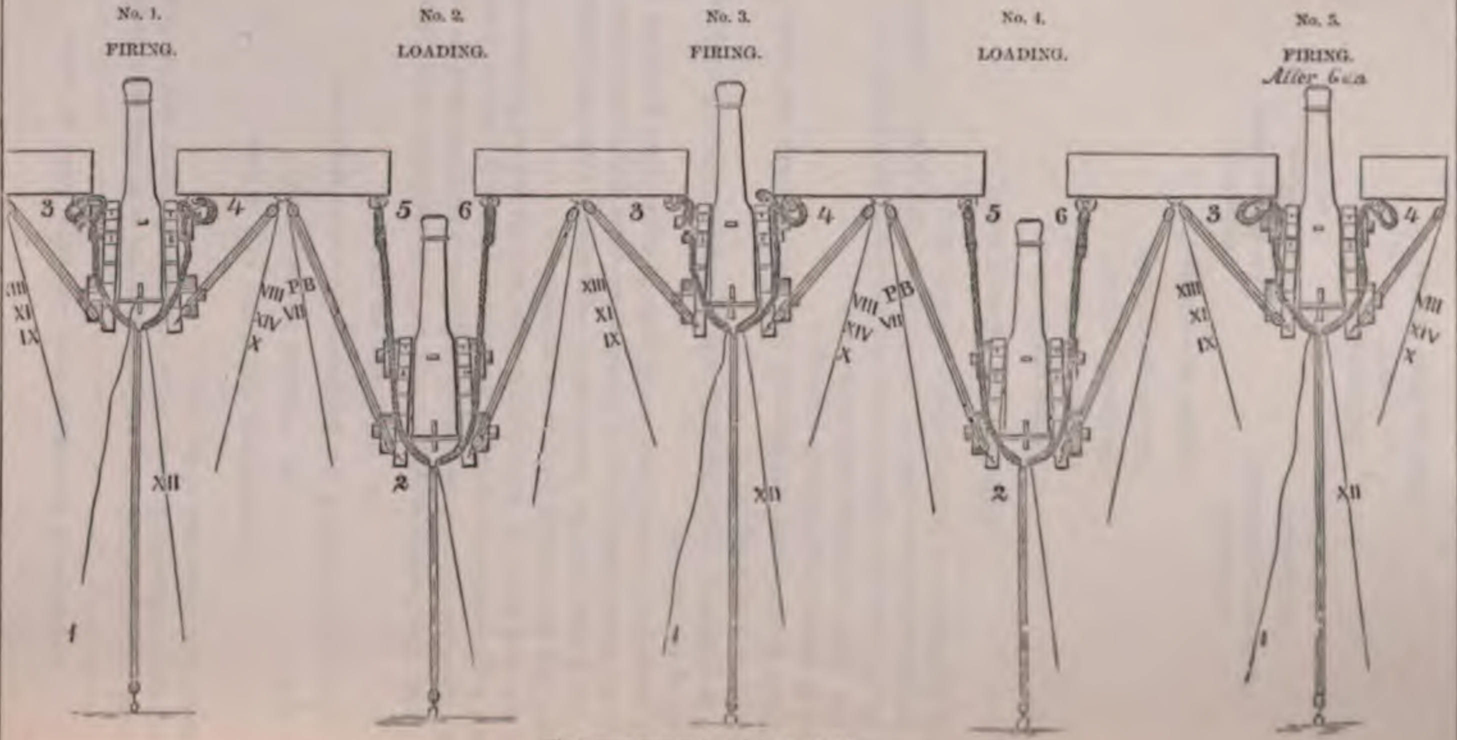
PORT GUNS. [Diagram C.] F.



14 men and a boy, stationed at a 57 cwt. Gun, both sides being manned by the half crews.

Starboard Guns.

[Diagram C.]



The Roman numerals indicate the Shifting men.

tains, because the "Shifting men" are supposed to be with them, ready to run out if required; the order of the commands, however, may be changed to suit any other state of the case.

PREPARATORY COMMANDS AND DUTIES.

245 1st. "Silence! Man both sides!"

The guns' crews will man the guns as directed in article 233.

2d. "Cast loose and provide!"

246. The *Captain* at the gun, with the Train-tackleman to aid him in taking off the covers of the lock and sights, and placing them and the straps and toggles amidships, middling breeching and handling quoin, is to attend to the same duties as those prescribed for both 1st and 2d Captains when providing and working the guns on one side only.

The *Sponger* and the *Loader*, aided respectively by the Side-tackleman and the Handspikeman, are to attend to the same preparatory duties as are prescribed for both Loaders and both Spongers when providing and working one side only.

The *Shellman*, in addition to his ordinary duties, handles the left handspike in freeing the quoin.

The *Side-tackleman* provides sand and water, sprinkles and sands the deck if directed, and assists the Sponger.

The *Train-tackleman* hooks train-tackle.

The *Fireman* provides fire-buckets and lanterns for both guns of the pair.

The *Handspikeman*, aided by the Shellman, does what is required of both Handspikemen when exercising one side only.

EXERCISE. (*See diagrams C and D.*)

247 **Words of Command.**

1st Captains—"Prime!"

1st Captains—"Aim!"

1st Captains—"Fire!"

"Shifting Men—Change!"

1st Captains, "Serve Vent and Sponge!"	2d Captains, "Run out and Prime!"
1st Captains, "Load!"	2d Captains, "Aim!"

2d Captains,
"Fire!"

"Shifting Men—Change!"

248. To continue the exercise the orders will be the same, applying to 1st Captains those which were given to 2d Captains, and reciprocally.

249. After exercising the men sufficiently in the order of commands just described, it will be well, by way of transition, and before giving the order to Captains of guns to continue the exercise, to confine it for a while to *three* commands, as follows:

FIRST.

1st CAPTAINS,	2d CAPTAINS,
"SPONGE AND LOAD!"	"AIM AND FIRE!"

SECOND.

"SHIFTING MEN—CHANGE!"

THIRD.

1st CAPTAINS,	2d CAPTAINS,
"AIM AND FIRE!"	"SPONGE AND LOAD!"

OBSERVATIONS ON THE EXECUTION OF THE COMMANDS.

250. The order "*Prime!*" is executed as in the exercise of guns on one side only.

251. The order "*Aim!*" as in the exercise of one side, except attending the train-tackle, which is to be done by the 2d Train-tackleman when the gun's crew consists of more than 10 men, by the 2d Hand-spikeman when the gun's crew consists of but 10 men, and by the 2d Shotman when the gun's crew consists of less than 10 men, and excepting, also, that the Train-tackleman is in all cases to attend the quoin or screw, in place of the 2d Captain.

252. The order "*Fire!*" the same as in fighting one side only.

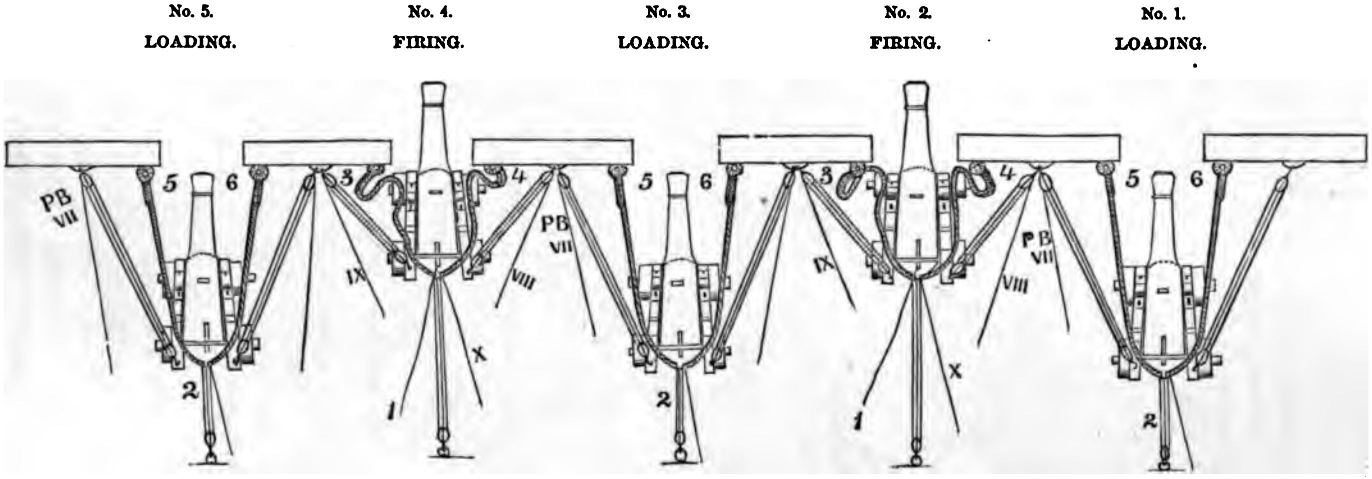
253. At the order "*Shifting Men—Change!*" the shifting men go promptly from one gun of a pair to the other, and distribute themselves at the side and train-tackles, as shown by diagrams C and D, the left Hand-spikeman first shipping his handspike in the training loop, ready to give the gun the proper direction in running out.

254. "*Serve Vent and Sponge!*" as in exercising one side, except that the sponging and loading are to be done by the Sponger and Loader stationed at the gun, alone; the Captain is to pass the sponge and rammer to the Sponger, and the Sponger is to return them to the deck. The Hand-spikeman examines and clears the sponge-head and worm.

Fighting both Sides.

[Diagram D.]

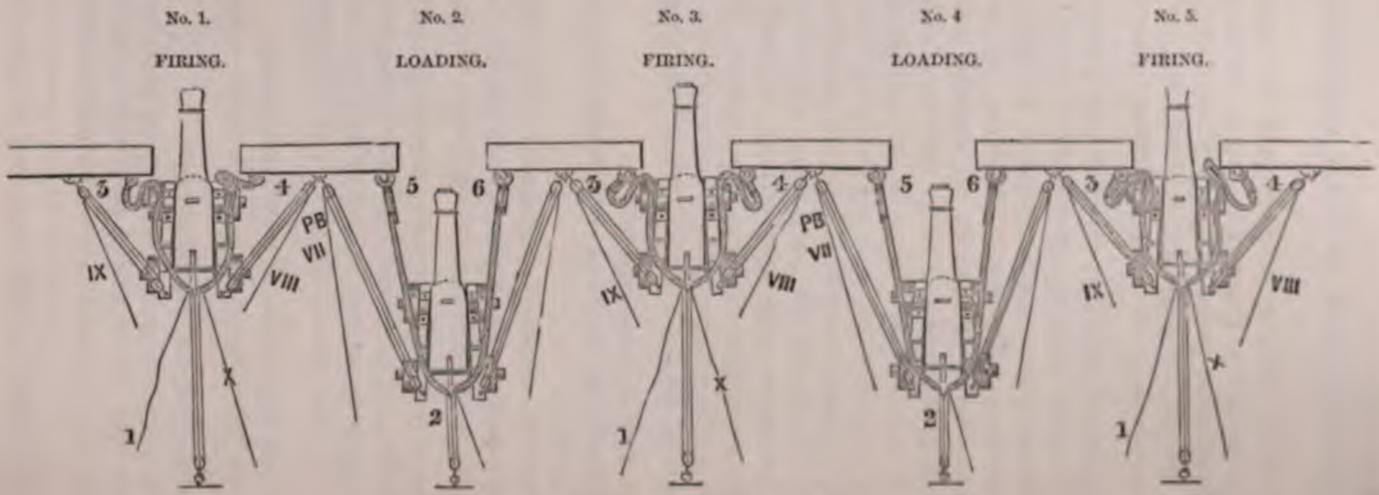
PORT GUNS.



10 men and a boy, stationed at a 42 cwt. Gun, both sides being manned by the half crews.

Starboard Guns.

[Diagram D.]



The Roman numerals indicate the Shifting men.

255. "*Run out and Prime!*" as in exercising one side, except that the *left handspike* alone is to be used by the Captain of the gun, and that the Sponger and Loader at the gun are to do the duties required of the 1st Sponger and 1st Loader in fighting one side.

256. "*Load with Cartridge!*" as in the exercise of one side, except for 1st Sponger and 1st Loader read Sponger and Loader.

257. "*Load with Shot!*" the same as in exercising one side, except that the Shellman passes shot and wad to the Loader, (*see diagram,*) and for 1st Sponger and 1st Loader read Sponger and Loader, and that the Sponger returns the rammer to the deck instead of to the 2d Sponger.

258. "*Load with Shell!*" for second Loader read Shellman, for 1st Loader read Loader, and for 1st Sponger read Sponger.

The Shellman covers the box again, goes for another shell, and sends the empty box below.

For 1st Sponger and 1st Loader read Sponger and Loader, and omit the paragraph relating to Handspikemen.

259. When the order to "*Secure!*" is given, and the guns are run out, the *Shifting* men divide into 1st and 2d parts and repair to the guns of their respective 1st and 2d Captains. The order "SECURE!" is then to be executed as in the exercise of one side, except for 1st Sponger and 1st Loader, throughout, read Sponger and Loader; that the Handspikeman is to be aided by the Shellman in freeing the quoin and lowering the breech, and at the proper time in raising the breech and levelling the gun; that the Train-tackleman is to handle the quoin or screw; that the Captain in hauling the breeching through the jaws of the cascable, is to be assisted by the Train-tackleman, who is to put on the lock and sight covers, (and in Friction carriages, the housing-chock in place,) and hook train-tackle to side-tackle bolts; and that the Side-tackleman on the side of the Loader, and the Shellman on the side of the Sponger, are to unhook the double-blocks from the side-training bolts and hand them to the Sponger and Loader.

260. *If the lower-deck guns are to be housed*, it will be done as in the exercise of one side, except that for 1st Sponger and 1st Loader, throughout, read Sponger and Loader; and that in raising the breech to free the quoin, and in lowering the breech upon the axle-tree, the Handspikeman is to be aided by the Shellman, the Train-tackleman withdrawing the quoin and bed.

The Port-tackleman lowers the port-lid and brings the port-bar to the Sponger and Loader.

QUICK FIRING.

261. The service of the guns consists, essentially, of two distinct parts, *pointing* and *loading*. The first of these, *pointing*, cannot be performed too carefully and methodically, and requires extreme coolness and attention on the part of the Captain of the gun; *loading*, on the contrary, cannot be executed with too much rapidity, provided neither the safety of the gun nor of its crew be compromised.

It is clear that if two hostile vessels meet equally matched in all the ordinary points of equipment and preparation, and manned by crews equally skilled in gunnery, the advantage will be in favor of the ship that loads quickest; and should it happen that nicety of aim becomes a matter of secondary importance, in consequence of the closeness of the action, then, evidently, rapidity of fire will determine the affair.

These considerations appear decisive, and every care should be taken, in the instruction of guns' crews, that pointing be executed with deliberation, care, and method, and loading with all possible despatch. In order, therefore, to insure the great advantage of rapid firing, officers are enjoined frequently to exercise the crews in setting the cartridge, shot, and wad home together, in one motion, of such guns as may be loaded in this manner, without inconvenience. This is the case with all the guns, chambered as well as unchambered, excepting the 8-inch shell-gun of 63 cwt. of patterns earlier than 1851; it is not recommended, however, to practice simultaneous loading with guns of higher calibre, such as IX-inch and upwards, as nothing will be gained by it in point of time.

To prevent the shot from rolling on the tie of the cartridge and jamming it, the end of the cartridge-bag, outside of the tie, should be shortened as much as security will permit, unless it has been specially prepared for this use, by stitching back the end in the form of a cockade.

With the view of affording the Loader a certain and independent means of knowing when the whole load is really home, the handle of the rammer should have a mark upon it, easily distinguishable either by day or night, and this should be suited to the "ordinary firing" charge of powder, due allowance being made for the others.

COMMAND.

"LOAD IN ONE MOTION!"

262. The Loader receives the cartridge and puts it in the gun, as already described; he also receives the shell or shot and wad and introduces them accordingly.

As soon as the *whole charge* has been introduced, the Sponger and Loader together thrust it down smartly with the rammer, as in ordinary loading.

When *home*, the men run the gun out as quickly as possible; the Captain of the gun clears the vent, primes in running out, points and fires in the usual manner, but as rapidly as is consistent with a good aim, taking care that the muzzle is clear of the port sill, and on lower-decks that the port is triced up clear of the explosion.

SHIFTING BREECHINGS IN ACTION.

COMMAND.

"SPONGE, LOAD, AND SHIFT BREECHING!"

263. Supposing the gun's crew to be reduced to six men and the Powderboy, that being the least number required to perform the evolution, and the gun to be discharged and run in. The 1st Captain hauls taut the train-tackle and chokes the luff, and the 1st Loader and 1st Sponger place the chocking-quoins forward of the front trucks, and proceed to sponge and load the gun in the usual manner. The 2d Sponger and 2d Loader haul taut side-tackles and choke luffs, or if rolling deep, hitch the falls round the straps of the blocks, and then unshackle the old breeching and shackle the new, which is to be brought to the gun by the 2d Captain.

The 1st Captain removes the old breeching from, and places and secures the bight of the new one in the jaws of the cascable, after the gun is sponged. The 2d Captain passes the old breeching amidships, and the men resume their usual duties at the gun.

When there are more than six men at the gun, the 2d Sponger and 2d Loader, after securing the side-tackle falls, will assist to load the gun, and the additional men will assist in unshackling the old and shackling the new breeching, but one of these will do all the duties just assigned to the 1st Captain, so as not to interfere with his ordinary duties in loading.

SHIFTING TRUCKS.

264. The operation of shifting a truck can only be required when the gun is "*run in*" after firing. *At the order to shift any one of the trucks that may be designated:*

With the Marsilly carriage.—Heave up with the roller hand-spike under the end of the bracket on the side on which the truck is to be removed; hand-spikemen pass inside the breeching and place their handspikes under the fore axletree as near the truck as possible, and, assisted by 5 and 6, lift the gun while the shellman removes the old truck and side tackleman puts on new one.

With the ordinary carriage.—To shift a *rear* truck, hand-spikemen lift under the rear axletree. To shift a *front* truck the rear truck on the opposite side should first be taken off, then hand-spikemen lift under the fore axletree.

EXERCISE OF PIVOT GUNS.

XI-INCH SHELL GUN,

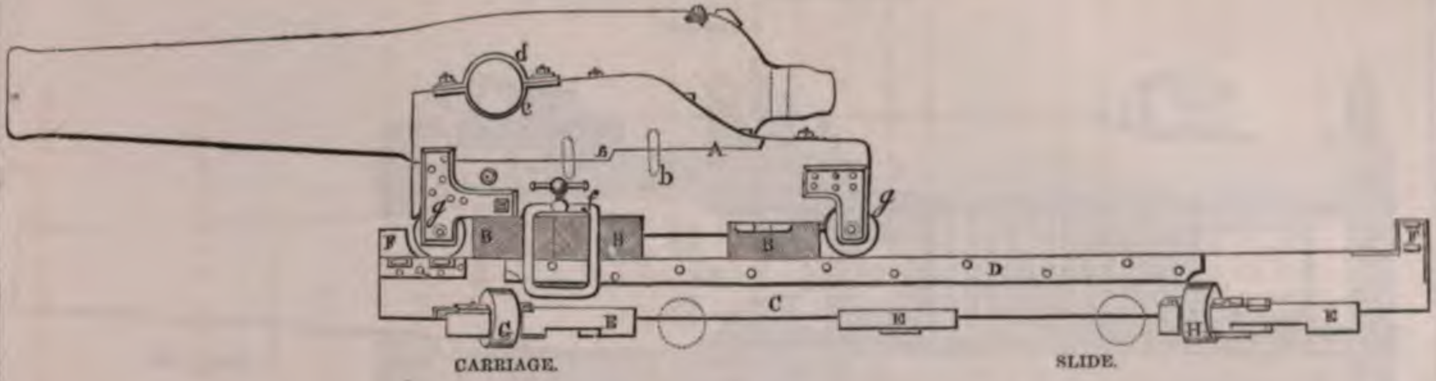
(*For example.*)

265. Arranged to traverse on circles fitted with *Bossed Sockets* for pivoting, and with clevis-bolts and sockets for housing.

EQUIPMENTS AND IMPLEMENTS.

Articles.	Where they are to be put when the gun is secured.
Carriage and slide complete, with elevating screw and pivot bolts.	In place.
Two front roller levers Two rear.......do Two levers for training and shifting trucks.	Becketted to brackets.
Two in-tackles	Hooked in place.
Two out-tackles	Do. do.
Two shifting-tackles	Made up on slide.
Two training-tackles	Do. do.
Breeching	In place.
Preventer	Do.
Lashings for securing gun	Do.
Tompion with wad and laniard	Do.
Sponge and cap Rammer	Becketted to beams between decks, or inside the brackets.
Lock, with string Vent plug	In place.
Lock-cover and strap	In place on gun.
Breech-sight and cover	Do. do.
Reinforce-sight and cover	Do. do.

Side elevation of XI-Inch Gun-carriage and Slide.



WOODEN PARTS.

A. *Brackets of two pieces ,with jog* (a) *and dowels* (b.)

B. *Transoms, (projecting beyond the rails,) front, middle, and rear, jogged into brackets.*

METAL PARTS.

d. *Cap squares.*

e. *Trunnion plates.*

f. *Compressor, with screw and lever.*

g. *Rollers and journal plates.*

WOODEN PARTS.

C. *Rails.*

D. *Compressor battens.*

E. *Transoms; front and rear each in two parts, middle in one part.*

F *Hurters, front and rear.*

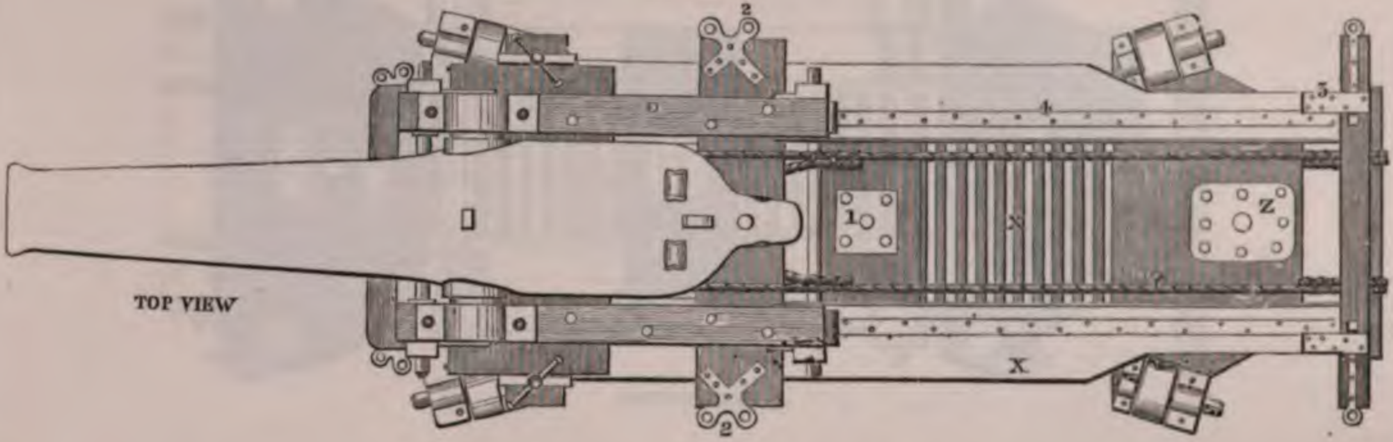
METAL PARTS.

G. *Shifting trucks.*

H. *Training trucks, both with journals and eccentric axles.*

Plan of XI-Inch Gun-carriage and Slide.

[Diagram K.]



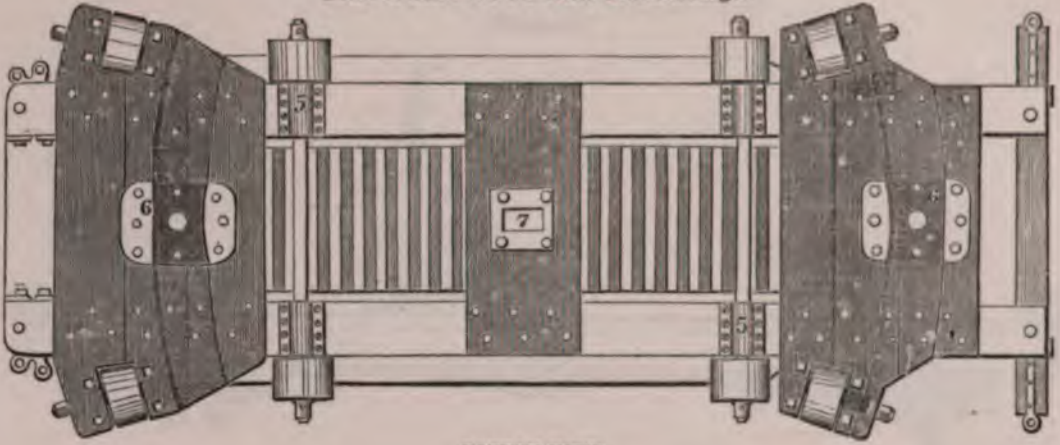
WOODEN PARTS.

X *Battens and Slats.*
Y. *Preventer Breechings.*

METAL PARTS.

Z. *Upper Pivot-plate.*
1. *Middle Roller-plate.*
2. *Eyes for Tackles.*
3. *Hurter Straps.*

Plan of Slide for XI-Inch Gun-carriage.



BOTTOM VIEW.

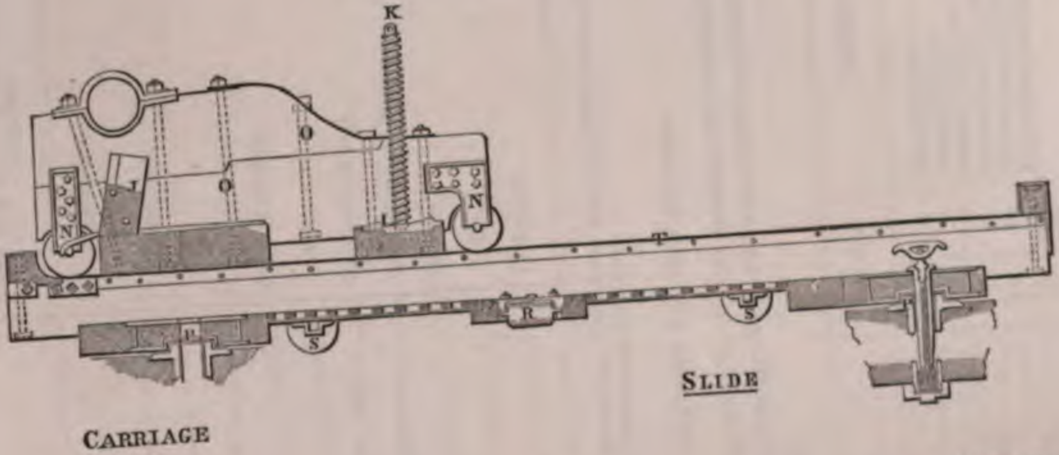
METAL PARTS.

5. *Transporting journals.*
6. *Pivot-plates and guide-flanges.*
7. *Middle roller.*

NOTE.—All metal parts are composition except the axles, levers, elevating screw, and bracket-bolts.

Sectional View of XI-Inch Gun-carriage and Slide.

[Diagram N.]



WOODEN PARTS.

J Breast Transom, scored for elevation, as is also the middle transom.

METAL PARTS.

K. Elevating Screw.
L. Saucers.
N. Inside journal plate.
O. Bracket bolts.

METAL PARTS.

P. Bossed Sockets, Plates, and Pivot Bolts.
R. Middle Training Truck with Journals.
S. Transporting Trucks, Axles, and Journals.
T. Guide Plates inside of rails.

EQUIPMENTS AND IMPLEMENTS—Continued.

Articles.	Where they are to be put when the gun is secured.
Trunnion-sight	In box between decks.
Priming-wires	Inside brackets.
Boring-bits	
Water buckets	Hold.
Hand-swabs	Breast of carriage.
Selvagee-wads	Do. do.
Battle-axes, as allowed, (*art.* 101)	On breast transom.
Two transporting axles and trucks	In storeroom, at hand.
One shell in box	On slide.
Shell-bearer	Do.
Rail transom chocks[*]	Under rails.

[*] These should always be kept under the centre transom when the carriage is not in use; also in firing at high angles of elevation to relieve the rails of the shock.

STATIONS AND GUN NUMBERS.

266. The following are to be the gun numbers and stations for a gun's crew of twenty-five, including the Powderman, the XI-inch shell gun being taken as an example:

Left side.	Gun No.		Right side.
First Loader	3	4	First Sponger.
Second Loader	5	6	Second Sponger.
First Shellman	7	8	Second Shellman.
First Front Leverman	9	10	Second Front Leverman.
First Compressman	13	14	Second Compressman.
First Rear Leverman	11	12	Second Rear Leverman.
Tacklemen	17	18	Tacklemen.
	19	20	
	21	22	
	23	24	
First Train Leverman	15	16	Second Train Leverman.
First Captain	1	2	Second Captain.
Powderman	25		

To reduce from 24 men and Powderman to 20, omit four highest numbers.

To reduce from 20 men and Powderman to 16 men and Powderman, omit four next highest numbers.

To reduce from 16 men and Powderman to 12 men and Powderboy, omit four highest numbers; 7, 8, and 9 become Pikemen, 11 and 12 Compressmen and train levermen, in addition to other duties.

To reduce from 12 men and boy to 10 men and boy, omit two highest numbers; 5 becomes Pikeman, 7 becomes Fireman, 9 and 10 Compressor and Train Levermen, in addition to other duties.

EXERCISE FOR HEAVY GUNS.

MOUNTED ON PIVOT CARRIAGES

XI-INCH SHELL GUN. (*As an example.*)

267. The gun is supposed to be secured amidships, fore and aft, over the housing pivot, and not loaded.

The exercise will proceed in conformity to the following words of command, viz:

I. "SILENCE! CAST LOOSE AND PROVIDE!"
II. "RUN IN!"
III. "SHIFT PIVOT!" To the *right* (*or left!*)
IV. "SERVE VENT AND SPONGE!"
V. "LOAD!"
VI. "RUN OUT!"
VII. "PRIME!"
VIII. "AIM!"
IX. "READY—FIRE!"
X. "SHIFT TO HOUSING PIVOT AND SECURE!"

N. B.—It is always to be understood that when any of their respective duties under one command are executed, the men will at once proceed to prepare for those which follow next in order. The exercise must be considered as a whole, though the details are necessarily divided under the several words of command.

EXERCISE OF PIVOT XI-IN. CANNON

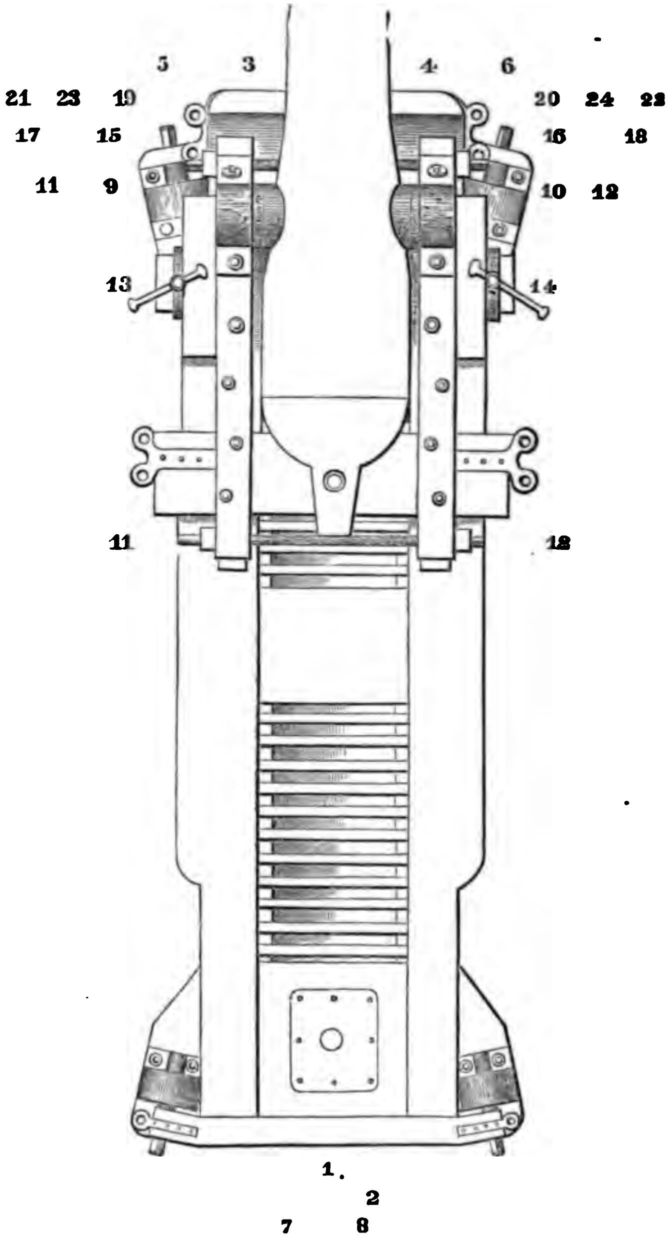
Gun secured for sea amidships.

I. "SILENCE! CAST LOOSE AND PROVIDE!"

268. No. 1, Commands; sees his gun cleared and cast loose; circles cleared and swept; tackles hooked; levers shipped; lock and sights in

Stations before Casting Loose.

[Diagram 1.]



place; elevating apparatus, pivot-bolts, and compressors in working order; takes off lock-cover and hands it to 23, who lays it clear of circle; provides himself with waist-belt and primers, priming-wire, boring-bit, and thumbstall; and sees that all the gear and implements are ready for use, and the men at their respective stations.

No. 2, Takes off sight-covers and hands them to 22, who lays them clear of circle; removes rail-chocks and assists in casting loose. He provides waist-belt and primers, and sees that the men on his side of the gun execute promptly their several duties.

CAST LOOSE.

(Diagram No. 1.)

Clear away the Bulwarks	15.16.17.18.23.24.	
Lashings of Gun—Adrift	3.4.11.12.	
In Tackles—Cast loose	15.16.	
Out Tackles—Cast loose	13.14.	
Training Tackles—Cast loose	19.20.21.22.23.24.	
Implements	*Qr. Gunner.*	
Powder	25.	
Shells, Shell-Ladle, &c	7.8.	
Sponge Rammer } Take down	5.6.	
Fore Carriage Levers, Ship*	9.10.	
Rear Carriage Levers—Ship		11.12.
Slide Levers—Ship forward		15.16
Sight-Covers—Take off. *2d Capt. and hands to 22.*		
Buckets of Water†—Fill Wet Swabs—Bring		5.6.

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[*] When the trucks are to be brought into play, the levers should be shipped on their axle squares so as to heave upwards, past the centre, and rest against the wood of the Carriage or Slide; otherwise they must be kept in place by hand or by a pin, neither of which entirely secures the Levers from flying back and doing mischief. If hove *down*, they are apt to interfere with the Tackles.

In order to ship the levers expeditiously on the proper square, both are to be marked with a Cold Chisel.

The Fore Carriage Levers require the effort of two men at each, as the weight of the Gun has most bearing there; each of the other levers is readily worked by one man.

[†] Principally to moisten the Sponge, which ought never to be omitted, as there is nothing so effectual in extinguishing any fragments that might remain burning in the Bore, and cause accidental explosion in loading, particularly in blank firing. It is a mistake to suppose that this practice increases the foulness of the Bore; on the contrary, it prevents it from hardening and accumulating, as long experience has shown. Sometimes it is convenient for the Spongers to dip the Sponge alongside, and they soon acquire the habit. Superfluous moisture is easily gotten rid of by twirling the Sponge at the handle.

Outer Train-tackles hook as Shifting Tackles	to Deck	21.22.
	to Slide	23.24.
Inner Train-tackle* hook	to Deck	17.18.
	to Slide	19.20.
Attend Compressors		13.14
Man In-Tackles		11.15.17.19.21.23. 12.16.18.20.22.24.
Man Carriage-levers	Fore.	9.10.
	Rear.	11.12.

269 STAND BY TO RUN IN.

(Diagram No. 2.)

Ease Compressors† and go to In-tackles		13.14.
Up Carriage-levers†	Fore.	3.9 and 4.10
	Rear.	11.12.
Tend Out-tackles		5.6.

II. "RUN IN"†

Haul on In-tackles		11.13.15.17.19.21.23. 12.14.16.18.20.22.24.
Out-tackle block—Unhook from Slide, to leave room for hooking Inner Training-tackle		5.6.
Down Carriage Levers	Fore.	3.9 and 4.10.
	Rear.	11.12.
Tauten Compressors		13.14.

270 STAND BY TO PIVOT

(Diagram No. 3.)

Draw Fore Pivot Bolt	3.4.
Up Fore Slide-levers	15.16
Man Outer Train-tackle	3.11.5. 9. 13.15.17.19.21.23. | | | | or or or or | | | | 4.12.6.10.14.16.18.20.22.24.

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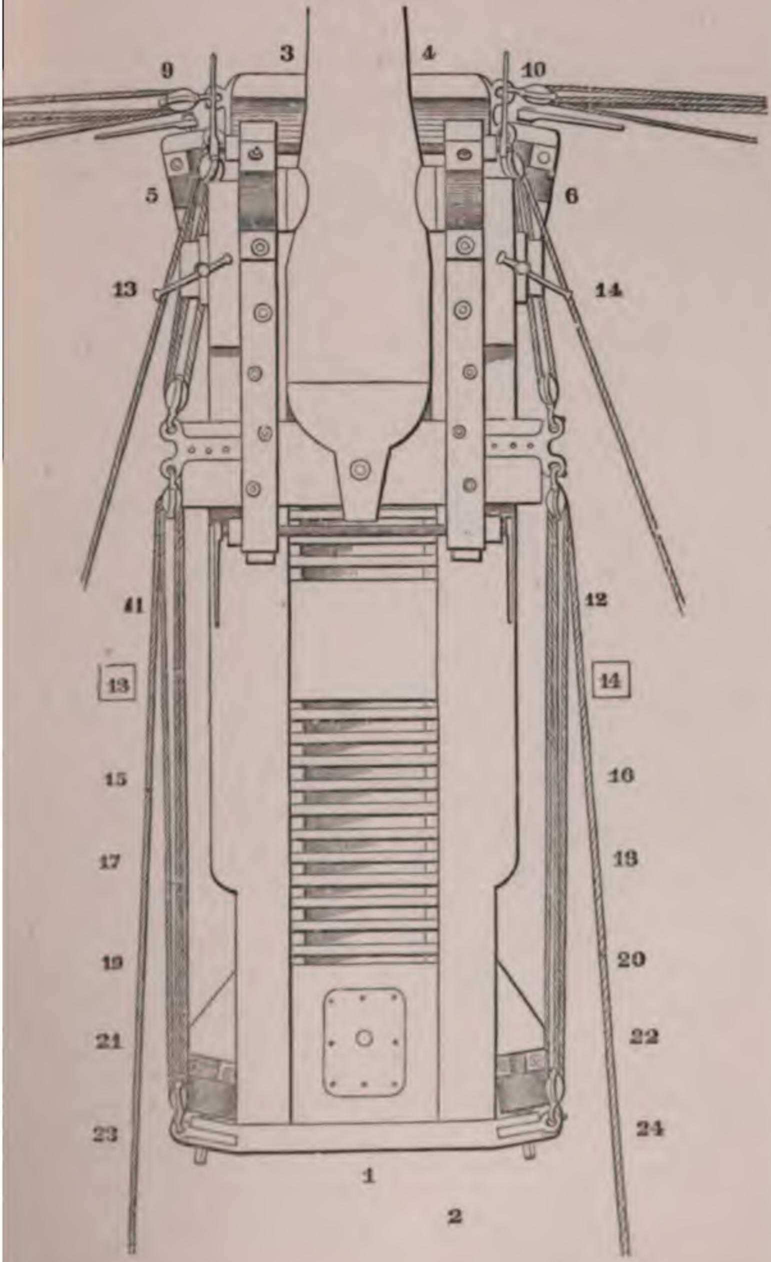
[*] Were it practicable to hook a tackle so that it would move the gun, even from amidships to the port without being shifted, or were it prudent to leave the gun free while shifting the tackle, there would be no need of a second tackle. But it is not possible, in pivoting, to exert direct action for more than the eighth of a circle by one position of a tackle, and it is absolutely dangerous at Sea to leave the Slide unconfined for an instant. When, therefore, the Outer-tackle is a block, the second tackle must be hooked and set taut.

[†] These orders are to be executed in quick succession, so as to be nearly simultaneous; that is, the compression is first relieved by backing its lever, upon which the Fore-levermen instantly bring the carriage on its trucks, and the gun is run back by the In-tackles, the Out-tackles being eased gradually so as to check any violent movement; for the trucks being fitted with friction rollers, allow the heavy piece to move suddenly and rapidly.

STAND BY TO RUN IN.

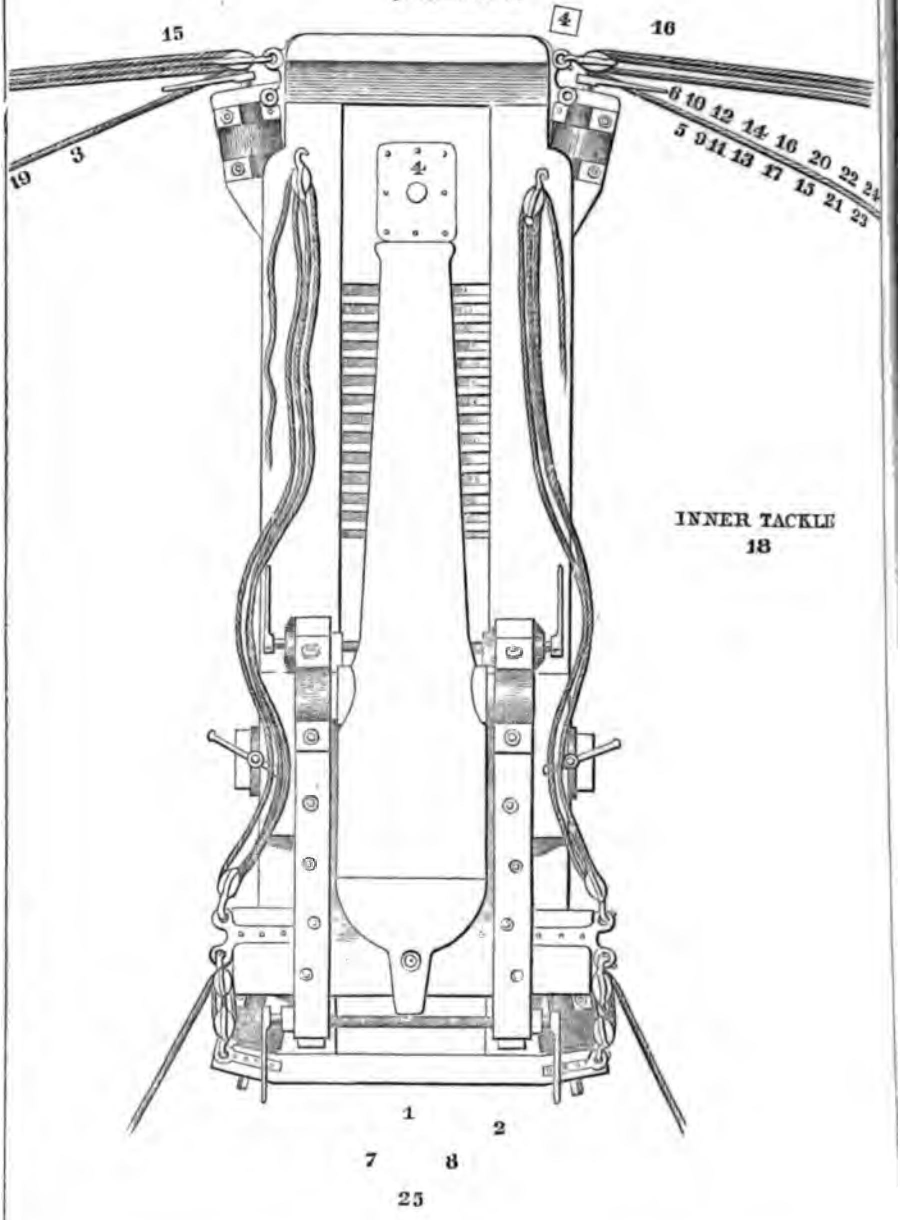
[Diagram No. 2.]



STAND BY TO PIVOT.

(STARBOARD.)

[Diagram No. 3.]



Attend opposite Outer Train-tackle		19.3 or 20.4.
Stand by to hook Inner Train-tackle, when the Outer tackle is a-block		17 or 18.

IV. "PIVOT TO RIGHT OR LEFT."

Haul on— Outer Train-tackle[†]		3.11.5. 9. 13.15.17.19.21[*].23. or or or or 4.12.6.10.14.16.18.20. 22. 24.
Ease away opposite Train-tackle		19.3 or 20.4.
Hook to Slide, Inner Train-tackle and Haul Taut		17. or 18.
Unhook Outer Train-tackles		21.22.23.24.
In Fore Pivot Bolt		3 or 4.
Shift Inner Train-tackles	To rear of Slide	19.20.
	To Deck	17.18.
Down Fore Slide-levers, unship them, and ship them on Rear slide Trucks[‡]		15.16.
Hook Out-tackle block to Slide		5.6.

Take stations for next order—which, if the Gun is loaded, will be "Run Out;" if not loaded, will be "Sponge."[§]

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[*] Other numbers may be called to assist, if needed.

[†] The pivoting of so heavy a Gun is the most complicated of all the operations with it, and demands *special drill*. When done to windward the hearty effort of the whole Gun's crew is required, particularly if there be much curve to the deck and no deck circles; to leeward there is no difficulty, and the time at sea to pivot from side to side may vary from four to seven minutes. The advantage of the Pivot Boss will now appear, as it secures the coincidence of the hole in Slide with that of the Socket, and permits the Bolt to be removed out or in easily. Hitherto the difficulty of doing so without a Boss has caused delay, and contributed more than anything else to the objections entertained against such heavy Ordnance, which have been in nowise obviated by either the "Pivot Shifting Screws" of our own Navy, or the pivot Flap of the English Navy.

[‡] Some difference of opinion may arise in regard to the shipping of these levers before the gun is Run Out, and they are required for pointing. To ship them now amounts to having them on the whole time—to which the only objection is, that if on, before wanted in pointing they may be in the way of the men; and, on the other hand, if not on, more attention may be demanded from 15, 16.

The question will not be material when the men are well drilled.

[§] The gun being now "pivoted to the Port," the Breeching should be shackled and the rear Pivot bolt drawn, in regular order. But neither of these can be done without running out the gun a few feet. For in order to pivot with the greatest ease, the carriage had been previously run back on the Slide to the rear Hurter, so as to bring the weight of the gun as near as possible to the Rear pivot, the very best position being with the Trunnions of the Gun just forward of the Rear-pivot The shackling of the Breeching and the removal of the Bolt are, therefore, deferred until the Gun has been run-out in the subsequent proceedings.

The Breeching is always to be shackled to the Ship's Side—not to the *Slide*, which needlessly strains the pivoting, and also causes the shackle with its appliances to interfere with the working parts at the forward end of the Slide.

When the Gun is *Run Out*—

Shackle Breeching*.................... 3.13—4.14.
Draw the Rear Pivot Bolt.............. 2.

IV. "SERVE VENT AND SPONGE."

(Diagram No. 4)

271. No. 4 is to receive the moist sponge from No. 6, right hand over, left under, to send it home, and, assisted by No. 3, to press it to the bottom of the Bore, then to turn it around two or three times in the direction that the worm may take,† withdraw it, strike the staff several smart taps under the muzzle, then return it to No. 6, who will receive it and lay it down,‡ the Gun Captain stops the Vent§ and as soon as the Sponge has been withdrawn, serves the Vent with his priming wire and again stops it.

This being done—

No. 20 hands the Rammer to No. 4 as soon as the latter has been relieved of the Sponge by No. 6. Should 4 observe that the Gun Captain has neglected to serve the Vent, he is to call his attention to it.

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[*] It is generally expected that the Compressors are to supersede the necessity for a Breeching. But experience shows that in firing it is better to rely habitually on the Breeching, and use the Compressors to assist. Thus in firing to windward at Sea, the Compressors are *always* to be set, but only so hard as may be required to ease the shock on the Breeching In firing to leeward, the Compressors are not wanted, except to secure the gun in its place when in. When the Ship is not steady but rolling, the discretion is to be exercised.

The Preventer, or Inner breeching, will be found indispensable to avoid accident when running out to leeward in a sea-way For with a trained crew, and all precaution in handling the levers and In-tackles, there is a liability to the gun getting away, in which case it moves out with great violence, and may do serious damage. On one such occasion an XI-in. gun cracked the stout iron straps of the Compressors, and seemed but just prevented from freeing itself entirely and going overboard over the Port sill. Not being able to replace the Straps, the Compressors were useless till late in the cruise. Preventer Breechings were then fitted, and answered so well that the practice was continued at sea as usual. They now form part of the equipment of all XI-in. guns, and should be just taut when the gun is out and the Trucks of the Carriage *reach* but do *not ascend* the curve of the forward Hurter.

[†] This is to detach from the bottom of the Chamber the fragments of burnt Flannel that are apt to adhere and solidify.

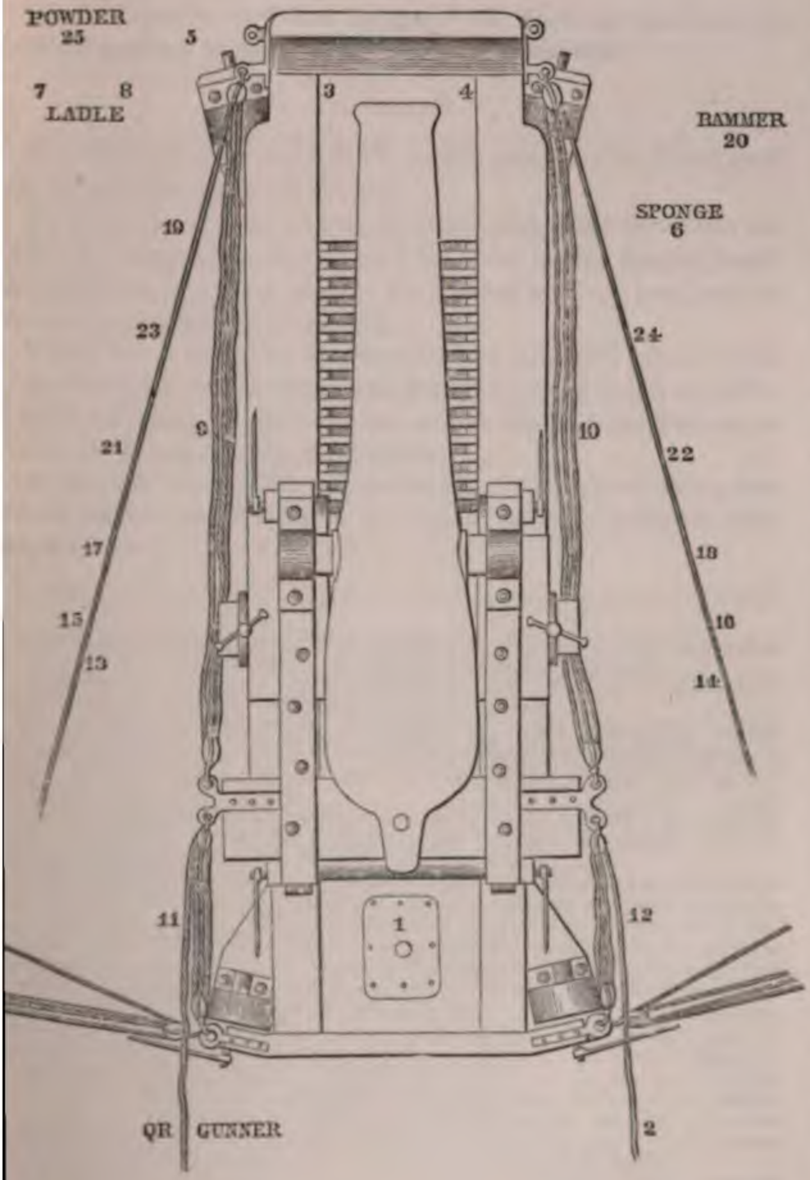
[‡] This practice encumbers the deck, and interferes materially at times with the management of the gun. Trial was, therefore, made on board the Plymouth, where the gun was on a covered deck, hooks attached to the beams above, near each piece, in which the Sponges and Rammers were placed after having been used. The only objection was that too much time might be lost in so doing; but after continued trials this was found not to be the case when the men had been properly trained.

It is said that the idea originated in the British Gunnery Ship "Excellent."

[§] Stopping the vent is omitted by many practised Artillerists as unnecessary in extinguishing fragments of the Cartridges. But as so much importance has been and still is attached to its performance, and it costs so little trouble, it seems better to continue the practice, particularly when so many accidents occur from premature explosion, not only to untaught and careless people in saluting on holidays, but also on shipboard, where they ought not to happen.

[Diagram No. 4.]

SPONGE—LOAD.



No. 3 stands ready with the Powder which he has taken from No. 5, to whom it was passed by No. 25.

Nos. 7, 8, open the Shell-Box, disengage[*] the Shell, and place it in the Ladle, in readiness to pass to Nos. 3 and 5. (Special drill.)

V. "LOAD."

272. No. 3 places the charge in the muzzle, seam from the Vent,[†] small end in, and pushes it well in the Bore.

No. 4, who stands ready with the Rammer, enters it into the muzzle, and pushes the charge home steadily, until the mark on the Rammer handle shows the charge to be in place.[‡] No. 3 assists with one hand, and the charge is *on no account to be struck.*[§]

Whilst No. 4 withdraws the Rammer, Nos. 7, 8 each take a handle of the Ladle, lift up the Shell,[‖] and, assisted by No. 5, pass it on to Nos. 3 and 4, who enter the shell into the muzzle sabot first and Fuze out, as soon as the Rammer is clear of the muzzle.

As the Shell lies just fair with the muzzle, No. 3 removes the cap from Fuze,[¶] which is passed along to the Gun Captain, and pushes the Shell into the Bore.

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[*] Sometimes the box has been fitted too tightly to the Shell, or has contracted on it, and delay is caused in loading. This should be attended to in season.

[†] Otherwise the stout stuff and seams found necessary with heavy charges might resist the primer, and cause a failure to explode the powder.

[‡] It was the habit at the Experimental Battery and in the "Plymouth," to mark the handle of the Rammer, so that there should be no doubt as to the charge being home. This is always useful, but particularly so in case of the gun bursting, as it makes sure of an important fact.

[§] It is a common practice in loading, to expend much zeal in striking the cartridge one or two blows to insure its being home, which is quite unnecessary when the mark on the handle affords so much better evidence thereof.

[‖] The XI-in. Shell weighs, when loaded, 135 lbs ; the lifting and entering it into the muzzle was one of the bug-a-boos that long afflicted those who were opposed to the use of heavy calibres. There was not one of the crew of the Plymouth's XI-in. gun that was not found able, on trial, to take up the Shell and unassisted to put it in the Bore when the ship was still. At sea a very simple implement was used, (an iron segment with a bent handle on opposite sides.) The shell men, 7, 8, turned the shell out of the box into this ladle placed on the deck near No. 3, (the Loader,) who, when ready, took the left handle, and No. 5 (the 2d Loader) the right. These two lifted the Shell towards the muzzle, and No. 4, (Sponger,) standing on the Slide, received the right hand from No. 5 as soon as within reach. No. 3 (stepping on the Slide) and No. 4 continued to raise the *Shell to the muzzle*, which was not difficult because of the Bore being conveniently high above the Slide on which they were standing ; the Sabot projecting beyond the Ladle was entered into the muzzle, and the Shell pushed in, No. 5 taking the ladle back and laying it on the deck.

[¶] As this is very firmly fixed in the recess of the metal stock, it is to be removed by pulling *directly* on the tail, which, if twisted, will be likely to break, and thus cause a loss of time. The patch is passed to the Gun Captain, who puts it in his belt-box, and is afterwards handed to the Quarter deck by the Lieut. of Division, No. 4 enters the Rammer, and, assisted by No. 3, pushes in the shell until the mark on the handle shows it to be in place. It is most strictly forbidden to strike the shell with the Rammer.[*]

No. 6 takes the rammer from No. 4 and lays it down, or lodges it over head on the hooks. Whilst this has been doing, the preparation for the next order is to go on.[†] Nos. 13, 14 ease compressors, if no motion. If there is, they stand ready to ease at next order. The Out Tackles are manned by Nos. 19, 21, 23, 17, 15, 11, 13, and 20, 22, 24, 18, 16, 12, 14. The Inner Tackles tended by No. 2 and Qr. Gunner. The Fore Carriage Levers grasped by 3. 8, and 4. 9. The Rear by 11. 12.

VI. "RUN OUT."

(Diagram No. 5)

273. The mode of executing this order will vary with circumstances—by the gun being to windward or to leeward, and by the nature of the rolling motion.

To leeward, and with much motion, the tendency is to go out with dangerous violence.[‡]

Therefore, Nos. 5, 19, 21, 23, 17, 15, 13, and 6, 20, 22, 24, 18, 16, 14, haul cautiously on the out tackles, the Qr. Gunner and No. 2, assisted by 15, 16, holding well back on the In-Tackles with a turn caught; 13, 14 ease the compressors; Nos. 3, 9 and 4, 10 heave up the fore Carriage levers; Nos. 11, 12 keep down the Rear Carriage levers, unless it is seen that they are necessary.

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in order to verify the number of shells fired. When the Fuse has been uncovered, care must be taken not to let it be touched by the moisture of the hand, or by the sea water

[*] As the blow might dislodge the priming of the Fuze and prevent its ignition. It is well to dispense with any wad, even a gromet, if possible

[†] A good exemplification of the principle assumed for this exercise, that when any one of the men has executed an order he shall not remain in position until the order is given which requires him elsewhere; for he may not have any part in the next order, or even in that second next, as occurs after pivoting, when only a few numbers participate in the following orders: Sponge—Load, the remainder only doing so at the third following, viz: Run Out.

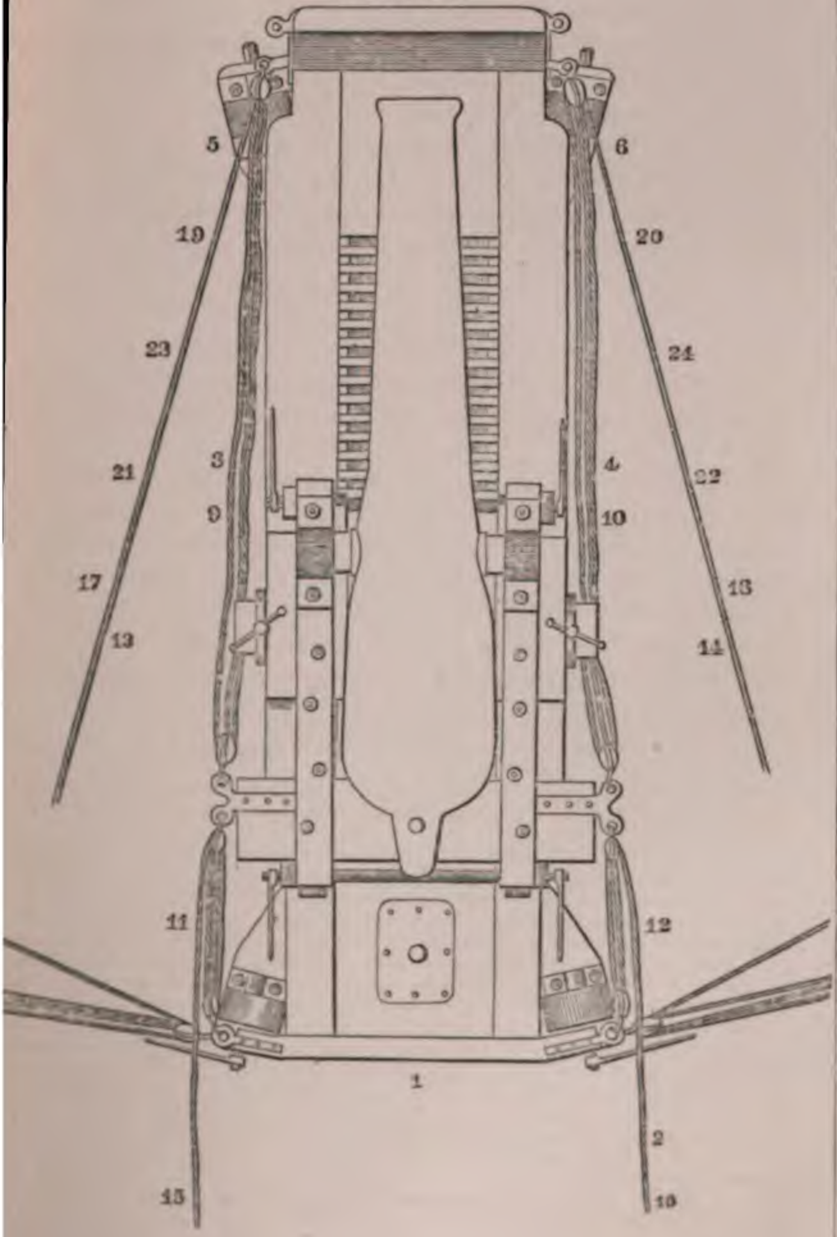
[‡] No operation with this gun requires more care. There is a weight of 20,000 lbs. moving on friction Rollers along a metal plate, down an inclined plane—if once permitted to get loose and to be propelled by the motion of the ship, the momentum is immense, and must disable some of the apparatus, perhaps the Gun Carriage itself. On such an occasion the preventer breeching is invaluable, and will be the best safeguard, if fitted so that when well stretched it will not permit the fore trucks to ascend on the curve of the Fore-hurter, for it is this which strains the strap of the Compressor.

Suffering the gun to go out with much force also displaces the shell, whether a gromet wad be used or not.

RUN—OUT.

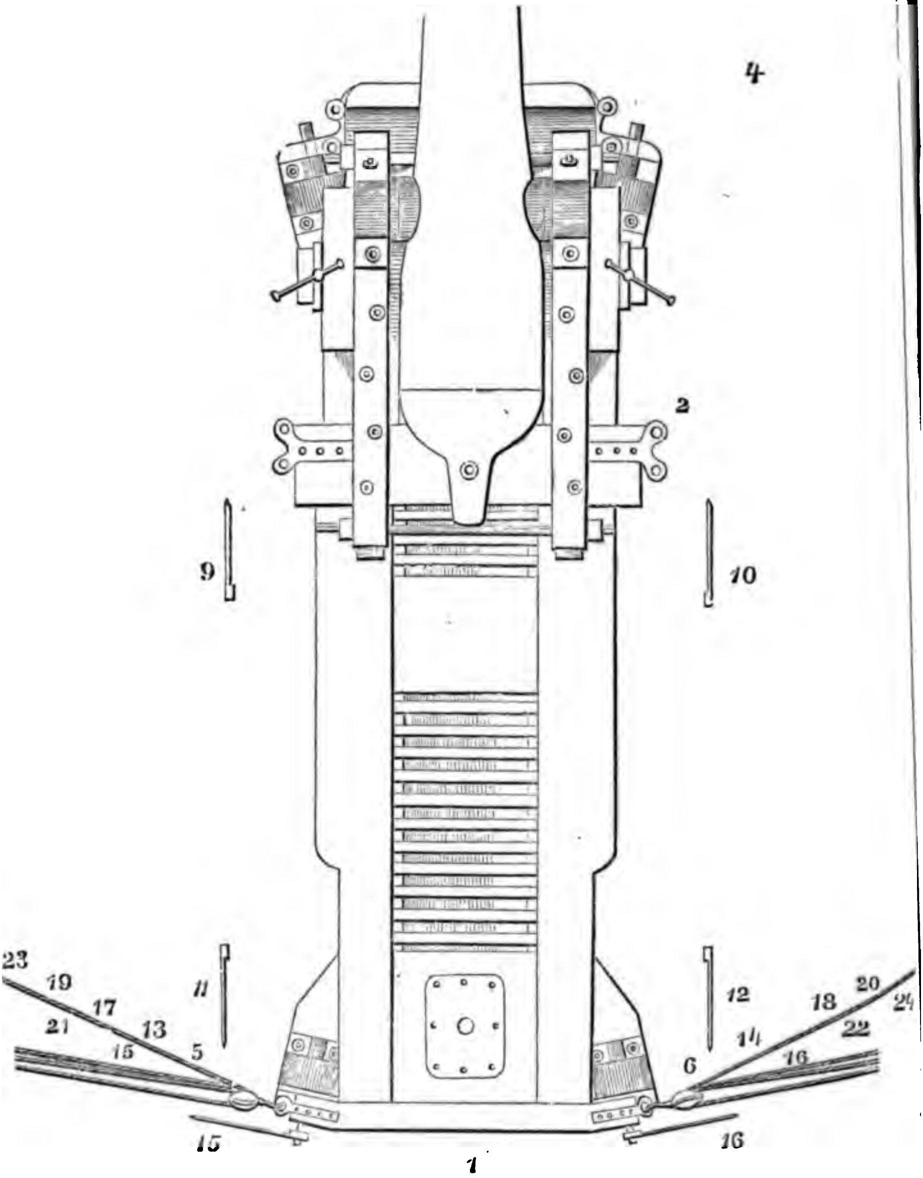
(TO LEEWARD.)

[Diagram No. 5.]



PRIME—AIM—FIRE.

[Diagram No. 6.]



In running out *to windward*[*] the compressors may be eased at once, the In-tackles slacked, the Carriage hove up on its trucks, and the gun run out by the Out-Tacklemen, assisted by any other of the Nos. not employed in other duties. When out, the Carriage levers are let down promptly and unshipped. The compressors are set[†] and Rear Slide lever shipped.

VII. "PRIME."

(Diagram No. 6.)

274. The Gun Captain again makes sure that the Vent is clear,[‡] and in so doing lets his wire down quickly into the charge.[§] If all is right, he inserts a primer.

If the Slide levers have not been shipped, or have been unshipped, they must now be put on the axles of the Rear Slide Trucks—15, 16.

The Rear Train-tackles will be manned by

$$\text{Nos}\left\{\begin{array}{l}13.15.17.19.21.23.5.\\14.16.18.20.22.24.6.\end{array}\right.$$

VII. "AIM."

275. The Gun Captain adjusts or verifies the sliding Bar of the Rear sight to the desired range,[||] and steps off the slide directly to the rear, lock-laniard in hand. The 2d Captain takes hold of the elevating screw,[¶] 15, 16 heave

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[*] To windward with a steady inclination the precautions used to leeward are unnecessary. On the contrary, the difficulty is to move so great a weight up the inclined plane. Therefore, the carriage is released from all restraint, and all the available force put at the Out-Tackles, taking advantage also of whatever roll there may be to windward.

[†] This must, of course, be regulated by circumstances, as already mentioned in Note 10; to windward set the compressors moderately; to leeward not at all; off the wind, according to the roll. Let the compression be so adjusted as to allow the muzzle just to come in.

[‡] It is an old custom for the Gun Captain to keep the Priming Wire in the vent while the loading is going on, feeling from time to time if the charge is home. It is a bad practice, because there is a liability of being caught by the charge as it comes along the Bore and having the wire bent, thus spiking the vent for a while at least. The mark on the Rammer handle is the best evidence that the charge is in place. The object now is only to clear the vent of pieces of cartridge stuff, which not unfrequently get into the vent, and choke it so as to prevent the primer from exploding the powder.

[§] Though the primers seldom fail to penetrate the flannel stuff of the cartridge, it is well to pierce the latter with the wire, so as not to omit any means that may insure the instant discharge of the gun.

[||] The Sight Bar of the XI-in. Gun is graduated to its own charge only; if reduced charges are ever used, it will only be at short distances when the gun needs no elevation. The Bar will then be down entirely, its head resting on the Box.

[¶] One turn of which is equal to one degree of the quadrant, and may be of service when the Sight bars are not

The carriages of Gun Sloops and other vessels carying XI-in. guns allow of an elevation of 20°.

up the levers of Rear slide trucks, and the training tackles are manned by

Nos. { 13.15.17.19.21.23.5.
14.16.18.20.22.24.6.
(Muzzle to the right or left.)

IX. "READY, FIRE."

276. The Gun Captain, with lock-laniard just taut and eye ranging over the sights, but kept well down to the bottom of the notch in head of sliding bar, and over the point of middle sight, awaits these being brought into coincidence by the roll with the object, which is always the WATER LINE—the Slide being trained constantly as desired by voice or sign.*

When sure of his aim the Gun Captain draws the lock-laniard promptly and firmly.

If the primer miss, the 2d Captain removes it, clears the vent, and puts in a fresh primer.

If the gun, when fired, does not come into its place for loading, ship Carriage levers, heave up, and run in by the In-tackles to a taut breeching.

Down all levers and set Compressors.

If the firing or exercise is to continue, the next order is "*Sponge.*"

If not, unshackle the breeching, then—*Run in,* back to rear hurter for pivoting—"*Stand by to Pivot*"—"Pivot *to right or left;*" when amidships—*In Pivot Bolt*—"*Run out,*" and secure for sea.

X. "SHIFT TO HOUSING-PIVOT, AND SECURE!"

277. The gun is brought into the housing position amidships and pivoted to the socket farthest from the extremity of the vessel, and run out.

No. 1 puts in the vent-plug, wipes and lays the hammer in place and the lock-string around it, and puts on the lock-cover; sees his gun properly secured, and the implements and spare articles returned to their places.

No 2 levels the gun and wipes off and relackers rear pivot-bolt and elevating screw; puts on sight-aprons; puts in rail-chocks and assists in securing lashings and breeching.

Loaders put in the tompion and on muzzle-bag, and wipe off and relacker the front pivot-bolt.

Spongers return rammer and sponge to place, and assist in securing lashings and breeching.

Levermen wipe off and relacker their respective levers and eccentrics, and secure levers in place and assist in securing the gun.

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* When the vessels are moving, it is best to train the gun a little ahead, watching when the object draws in line; then, as the roll brings the piece right in elevation, it is fired.

Compresor men wipe off, relacker, and tighten the compressors, and assist Carpenter in replacing and securing bulwarks.

Shellmen return shells, empty boxes, and shell-bearer to their places, and assist in securing bulwarks.

Powderman returns spare powder and passing-box to the magazine.

Tacklemen tighten and secure "in" and "out tackles," and make up and stow "shifting" and "training-tackles" on the slide; ship the clevis-bolts and pass and tighten the gun lashings; and, if required, assist in replacing bulwarks.

The several persons who provide implements and spare articles return them to their places.

TRANSPORTING PIVOT GUNS FROM ONE END OF A VESSEL TO THE OTHER.

278. The gun is to be pivoted and trained so as to bring its muzzle towards the direction in which it is to be transported, the transporting trucks are to be shipped and secured to their axles, the chocking quoins placed, the training trucks thrown out of action, the compressors brought to bear to confine the gun near the middle of the slide, some of the tackles hooked for dragging, and others, with capstan bars, for guiding and steadying it. The pivot-bolts are to be removed, and the gun's crew, aided by others if required, are then to transport it to the desired position at the other end of the vessel. The slide is then brought over and pivoted upon a fighting or outer centre, the transporting trucks removed, and the training trucks brought into action. The implements for working and loading the gun are to be brought to it, and it will then be ready for action.

When the forward and after slides are of different lengths, and the traversing circles of different diameters, the longest slide will be fitted with an additional rear pivot-hole and plate, to correspond with the smaller circle, that the gun may be worked from the midship pivot-bolt and shifted to the different fighting centres or pivot-bolts of the smaller circle.

Thus, when only one pivot gun is mounted forward and one aft, and when they can both be brought to bear from only one end of the vessel, the force may be doubled at that extremity, by pivoting one gun on each bow or quarter, as the case may be.

For heavy guns this is practicable in smooth water only!

Arrangements are made for shifting the broadside guns both to the bow and stern, in aid of the pivot guns, when the distance of the enemy is not too great. When the stern gun is pivoted over the rudder, one of the broadside guns may be worked on each side of it, in firing right aft. Guns mounted on pivot carriages may be fought upon the rear pivot, on the common or shifting centre, and fired from any point of the traversing or shifting circle, if the elevation be such as will not endanger the decks. In this case the training must be done with the gun run in over the rear pivot, as after it is run out the training will be difficult, and the helm must be relied on to bring the gun on with the object.

BOARDERS.

279. It is not supposed that any directions can be framed in such a way as entirely to provide for all the various circumstances which may require attention when about to board an enemy or to repel a similar assault made by an enemy upon our vessels.

The following general suggestions are, however, presented for the consideration of Captains, in order that some degree of uniformity may be preserved when other more important considerations do not prevent it.

280. Upon the call for "Boarders," the divisions which may be called should form on the gangway of the side which is not engaged, properly armed, and remain there till ordered elsewhere, provided there be time to make this disposition of them. In all movements from one part of the ship to another cutlasses should be sheathed and pistols in the frogs. The men of each division should be united as much as possible under their own officer. Bayonets not fixed until ordered.

"PREPARE TO BOARD!"

(FROM ANY SPECIFIED PART OF THE SHIP.)

281. The Boarders should repair to the place directed, taking care to keep themselves down so as not to be seen by the enemy, and form close to the bulwarks until the order is given to—

"BOARD THE ENEMY!"

282. The Boarders should then gain the enemy's deck as quickly as possible, keeping near enough to each other for mutual support, and to act in concert against the opposing force, using every possible exertion to clear the enemy's decks, by disabling or driving the men below.

In case the intention of boarding should be discovered by the enemy, and he should collect his men to repel the attack, the marines and small-arm men should take positions where they can best fire upon the men thus collected, and, if possible, the spar-deck guns loaded with grape, and howitzers loaded with canister, should be used for the same purpose, before the Boarders are ordered to make the attack.

So long as the contest is continued after boarding, the fire should be kept up against the enemy from all the guns with as much vigor as the number of men remaining at the guns will allow.

The guns should be much depressed at such time that there may be little or no danger to our own men. Much positive injury may be inflicted on the enemy in this way, besides the advantages of dividing his attention at such an important moment.

If it should be necessary to repel Boarders from the enemy, the Boarders and Pikemen should be called, and at the order—

"PREPARE TO REPEL BOARDERS!"

(AT ANY SPECIFIED PART OF THE SHIP)

283. The Pikemen should arrange themselves in rear of those armed with swords, and in situations which will allow them to rest the points of their pikes on the hammocks or rail, and cover that part of the ship, and the parts where the assault is expected. The marines, with their muskets loaded and bayonets fixed, may be formed behind the Pikemen, or at any other place from which their fire on an assailing enemy may be most effective, and least dangerous to our own men.

284. The moment an enemy commences his assault, the order—

"REPEL BOARDERS!"

Should be given, and every effort made to prevent his gaining or retaining any foothold in the ship.

It will, of course, be important to bring grape and musketry to bear at once upon the enemy's men when they are assembled for boarding, if they should be discovered in time.

The men left at the guns should be watchful that the enemy does not gain an entrance through ports or quarter-galleries.

In case the enemy should effect a landing on the decks, the pikes may, from their length and the press of the contending parties, become less efficient than the swords. Whenever this occurs the sword should be brought into full use as the most efficient weapon for attack or defence at such close quarters.

285. The howitzers, mounted on the field-carriage and charged with canister, should be ready for use in case of the emergency of the enemy s getting a footing on the spar-deck.

286. Unless induced by circumstances to attempt to board the enemy first, the most favorable opportunity for attack will present itself when his

men have been driven back; and to guard against the contingency of being repulsed, in all cases where the Boarders are called to attack the enemy, they are to be covered by the marines and all the available small-arm men on deck.

287. The men, and especially the Boarders and Pikemen, should be exercised and encouraged to practice with the single stick and sword as far as circumstances will allow.

NOTES UPON THE MANUAL EXERCISE.

FOURTH COMMAND.

"SERVE THE VENT AND SPONGE!"

"*The Gun Captain stops the vent!*"

288. A difference of opinion being entertained among artillerists with regard to the utility of stopping the vent, the continuance of the practice, as directed in the text, is recommended.

289. It has been the uniform practice at the Experimental Battery at the navy yard, Washington, and also on board the gunnery ship Plymouth, in 1857–'58, to use a moist sponge; and as no accident from premature explosion has taken place in either case, the inference is that the method is a safe one and might obviate other precautions, especially where reloading is necessary, as in firing salutes, and there being no shot over the cartridge, it is imperfectly consumed.

290. "*Strikes the staff several smart taps under the muzzle!*" to shake off any adhering fragments of the cartridge. Should any burning fragments be drawn out, the Loader extinguishes them with the wet swab; the Gun Captian again commands "sponge."

291. Gun Captain "*serves the vent with his priming-wire!*" If at any time he should find the vent obstructed and be unable to clear it with the priming-wire or boring-bit, he will at once report to the officer of division, who will order the vent-punch used; or if this should fail, have recourse to the vent-drill and brace in charge of the Quarter Gunner. The boring-bit, vent-punch, and drills should be used with caution, as, being of steel, they are liable to be broken off in the vent and thus effectually spike the gun. After clearing the vent the bore should be sponged.

292. Spongers and Loaders are to be careful to keep their bodies as much within the port as practicable, otherwise at close quarters they will be picked off by musketry.

FIFTH COMMAND.

"LOAD!"

"*No. 3 removes cap from fuze!*"

293. The cap is never to be removed until the shell has been entered in the gun. With high elevations, or when rolling, care should be taken that the shell does not slip down the bore before this is done.

boats or exposed bodies of men; they may be used also, under favorable circumstances, against the tops of an enemy.

SEVENTH COMMAND.

"PRIME!"

"He inserts a primer and turns the hammer down upon it."

305. To prevent the primer from being blown out of the vent by the blast of the next gun, as occasionally happens on light-covered decks.

With guns of the old pattern this cannot be done, because, if turned down, it would interfere with the aim.

306. It is essential that the head of the primer shall be placed flat and pressed close upon the vent, that the hammer may strike it fairly. The tip of shellac, by which the lower end of the tube is sealed, occasionally obstructs the jet of flame so as to split the tube. In this case the flame is dispersed laterally, and fails to ignite the charge; it is therefore a good precaution to pinch the end of the tube before putting it into the vent.*

307. The tubes of all the primers are carefully gauged before issuing them for service, but such as, from any cause, become so much enlarged as not to go easily into the vent, should be rejected without attempting to force them down.

It will occasionally happen, either from carelessness or inattention to the instructions given for the proper manner of pulling the lock-string, that the head of the primer will be crushed without exploding it. Frequently a second and stronger pull will have the desired effect, if the fulminate has not been dispersed; in case, however, this attempt should prove unsuccessful, the tube of the primer should be drawn out, if possible, before using the priming-wire to clear the vent.

308. In case either lock or primer should entirely fail, recourse will be had to the *friction-primers* or to the "*spur-tubes*." In using the first, the Captain of the gun, after taking the primer from the box, will raise up the twisted wire-loop until it is on a line with the spur; place the tube in the vent with the spur towards the muzzle of the gun, and so that this spur will rest on the lock-piece; then hook the laniard, fitted for the purpose, into the raised loop, and pull it, when otherwise ready to fire the gun, as though it were a lock-string, using, however, a less degree of force. The laniard may be hooked to the loop before the tube is put into the vent. When the

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* "In 10,000 fires, when testing guns of different calibres, with the regulation locks, less than fifty primers failed from all causes."

"spur-tubes" are used, the 1st Captain exposes the priming and the 2d Captain uses the match.

309. The men should be practiced at unloaded guns, in placing the primers, both percussion and friction, properly, and in pulling the lock-string so as to insure their explosion, until this very essential knowledge and skill have been perfectly attained.

EIGHTH COMMAND.

"AIM!"

"*His eye ranging over the sights!*"

310. The Gun Captain gives the necessary order "Muzzle to right," or "Left," "Elevate," or "Depress," by voice or sign. He alone should speak, giving his orders in a sharp, clear tone, but not louder than necessary for his own crew to hear him.

311. He should make use of the following signs, to assist in making himself understood, which, when the crew becomes well drilled, are sufficient without the orders.

In pointing.—He should move the left hand, held vertically, to the right or left, according as he wishes the right or left tackle hauled upon.

In elevating.—He should move the hand, held horizontally, up or down, according as he wishes the breech raised or lowered.

312. Officers of divisions, while instructing the men in aiming, should be particular in impressing upon their minds the necessity of bringing the eye to an exact level with the *bottom* of the sight-notch, as otherwise they will fire too high.

313. In lateral training, when the direction of the gun is frequently changed by the "coming up" or "falling off" of the ship, or when the position of the object to be fired at is rapidly changing by passing in opposite directions, or from other causes, it is better to train a little beyond, and then watch the proper moment for firing, instead of endeavoring to train it at once directly on the object.

314. The lateral training, or pointing, when considerable, should always precede the elevation.

315. "*If roller-handspike is not used in training, &c.*" A great difference of opinion exists on this point. The use of the roller-handspike somewhat facilitates *extreme train*, but the gun cannot be fired until it is unshipped, which alters the elevation and consumes time. It is perhaps

preferable to use one handspike under the bracket, manned by two men, and the other to "lift and screw the gun," manned by one man, under the transom.

316. "*Elevate or depress as directed!*" If the carriage is fitted with a quoin, handspikemen, standing between the handspikes and the side of the ship, place their handspikes on the steps of the carriage and raise the breech. As soon as the quoin is free, the 2d Captain takes hold of it with both hands, and withdraws the quoin to the full extent; handspikemen "raise" or "lower" the gun slowly and steadily. When the proper elevation is given, the gun captain gives the word "*Well!*" and the 2d Captain forces the quoin tight under the breech, giving the word "*Down!*" as soon as he perceives the quoin supports the gun.

317. To facilitate the operation of pointing guns according to the distance of the object aimed at, sights are prepared and fitted to each gun; as breast-sweeps should also be for all truck-carriages of heavy guns.

The ordinary sights which are now fitted consist of two pieces of bronze gun metal, one of which, called the "*reinforce sight,*" is a fixed *point,* firmly secured to the sight-mass, upon the upper surface of the gun, between the trunnions.

318. The other, or "*breech sight,*" is a bar or stem, with a "head," in the top of which is a "sight-notch." This bar or stem is made to slide in a vertical plane, in the "*sight-box*" fixed to the breech sight-mass, and is held at the various elevations for which it is graduated by means of a thumbscrew.

The bar or stem of the sight has lines across its faces denoting for all the old guns degrees of elevation, each of which is marked with the number of yards at which a shot or shell will strike the point aimed at, when that line is brought to a level with the top of the sight-box, and the gun is loaded with a specified charge of powder; for the guns of the new system, the ranges in even hundreds of yards.

The uppermost line on the stem marked "*level*" is the zero of the other graduations, and when adjusted to the level of the top of the sight-box, the bottom of the notch in the head of the breech sight and the apex of the reinforce sight show the "dispart" of the gun. When the line of sight coincides with these points, it is parallel to the bore, and when continued to a distant horizon, the gun is laid "level" or horizontal.

Sights should invariably be made so that the "level" line on the stem will correspond with the bottom of the head where it rests on the "sight-box," and thus secure a dispart-sight in case of accident to the screw in the sight-box.

319. For shot guns the ranges in yards for one shot with the "*distant firing*" charge of powder are marked for each degree of elevation on the *inboard* face of the sight-bar.

320. The gun being raised a certain height above the water, depending on the class of vessel and the deck on which it is mounted, it is evident that, with the sight at "*level*," the shot will have a range proportionate to this height. This range or distance is commonly called "*point-blank*," or "*point-blank range*," and is the number noted in the column marked "P. B.," or "0°," or "*level*" in range tables.

This "point-blank," therefore, depends on the class of gun, the charge, and the height above the water.

321. A preferable definition of this distance is "*range at level*."

322. As the aim is always supposed to be directed at the water line, if it were thus taken with the sight at "*level*" at an object at point-blank range, the shot would strike short of the point aimed at by about one-quarter of the distance; or, if aimed at the upper part of the hull, a distance below the point aimed at equal to the height of the gun.

323. In firing at small objects, particularly boats, within point-blank, it is therefore important to attend to this source of error. It is desirable that all sights should be marked from 100 yards to the greatest range, and therefore avoid all consideration of point-blank.

For shell guns the ranges are marked for shells on the sight-bars in the same manner as those for the shot of shot guns.

324. These sights being each adjusted to a particular gun, and marked with its class and number, do not, in strictness, admit of being transferred to other guns, even of the same class.

325. When used, the stem of the breech sight must be raised or lowered to correspond with the ascertained or estimated distance, in yards, of the object aimed at, and firmly secured there by the thumbscrew. Then, if the ship be steady, elevate or depress the gun until the line of sight from the bottom of the notch of the breech sight, the top of the reinforce sight and the point to be struck, will coincide; but, if the ship have a rolling motion, the gun must be so laid, after the sight is set for the distance, that this coincidence may be obtained, if possible, at the most favorable part of every roll which the ship makes.

326. The inclination of the line of metal to the axis of the bore varies in guns of the same class, as well as in those of different classes. Aiming,

therefore, by the line of metal cannot be relied on for definite ranges; besides that, within those ranges, it is apt to mislead by giving too much elevation to the piece. Therefore, when the established sights are not furnished, or have become unserviceable, *wooden* dispart-sights lashed on the reinforce should be immediately substituted. A narrow groove in the upper surface of the wooden sight, made to coincide with the plane of the line of sight marked on the gun, will assist the Gun Captain in getting the true direction quickly.

Half the difference between the diameters of the gun at the base-ring and swell of the muzzle, or at any intermediate point on the line of metal, will give the proper height of the dispart-sight at the point where the least diameter was taken, to which must be added the height of the lock piece above the base-ring, in order to get a line of sight over it, parallel to the axis of the bore.

327. All the new guns are marked on the top of the lock-piece, or over the vent, the reinforce sight-mass, and the swell of the muzzle, by notches which indicate a vertical plane passing through the axis of the bore, at right angles to the axis of the trunnions.

328. Pivot guns have been supplied with trunnion sights, which were designed to be used *only* when the ordinary sights will not give the required elevation, as this instrument gives but a rude approximation in either elevation or direction.

329. The rifled cannon in service have the breech sight on the side of the breech, and the front sight on the trunnion, which permits the gun to be accurately aimed at all elevations. It is intended in future to apply this arrangement to all cannon mounted on pivot carriages.

330. Various modes have been practiced to ascertain the *distance* from the object aimed at, when at sea, by which to regulate the elevation of guns, but none can be depended upon for giving it with minute accuracy, and when obtained it is continually varying; therefore, when the projectile fired is seen to exceed or fall short of the object considerably, the sight-bar must be readjusted accordingly. It thus becomes, under ordinary circumstances, the best instrument for approximating distances. In correcting the elevation, however, the variation of range to the first graze, attributable to eccentricity, differences of windage, and other causes, must be taken into consideration, as, under the most favorable circumstances, at the Experimental Battery, this variation is found to equal fifty yards, more or less.

331. In case the ordinary sights should be lost or rendered useless, *tangent firing* may be resorted to against ships, by pointing with the

wooden dispart-sight at such part of the ship as the tables indicate for the distance, and according to the class of gun in use at the time.

A table of this kind is appended, which has been calculated for the 8-inch and some of the heavier of the 32-pounder guns, when loaded with single shot and distant-firing charges.

The different classes of sailing ships-of-war, whether of the same or of different nations, are not of the same length, nor are their masts of the same height from the deck, or from the water. They, however, correspond so nearly, for the same class of ships of the same nation, that calculations made from the angles subtended by the average height of their masts, will generally give their distance with sufficient accuracy for general firing.

Tables are inserted at the end of the book, in which the distances corresponding to different angles made by the masts of English and French ships-of-war are shown—from which the intermediate distances due to other angles may be estimated, and the sights regulated accordingly, if circumstances should render it desirable. Also an abridged table in which the height of our own mast is used as the base.

332. Officers of divisions and Captains of guns should be occasionally practiced in measuring the distances of objects by the eye, at times when opportunities offer of verifying the accuracy of their estimate by comparing it with the distance obtained by the foregoing methods, or any other which will afford the best means of comparison.

333. Within point-blank range, if from any cause the *hull* of an enemy's vessel at such times cannot be seen, but only its *direction* be known, advantage may be taken of the flashes of the enemy's guns to determine, approximately, when the guns are level, in case the ship has a heel or a rolling motion.

334. Most naval guns are now fitted with elevating screws, passing through a hole in the cascabel of the Dahlgren system, and for those of the old system attached to the carriage: but the ordinary beds and quoins are also still in use; they are arranged to allow the extreme elevation and depression of the guns which the ports will admit with safety. When the inner or thick end of the quoin is fair with the end of the bed in place, the gun is level in the carriage; or horizontal, when the ship is upright. The degrees of elevation above this level, which may be given to the gun by drawing out the quoin when laid on its base, are marked on the side or edge, and those of depression on the flat part of the quoin, so that when the quoin is turned on its side for depressing, the marks may be seen. The *level* mark on the quoin is to correspond with the end of the bed. When the quoin

is entirely removed, and the breech of the gun rests on the bed, the gun has its greatest safe elevation; and when the quoin is pushed home on its side, the gun has the greatest safe depression that the port will admit.

Care must be taken that the stop on the quoin is always properly lodged, to prevent the quoin from flying out or changing its position, and that the bed is secured to the bed-bolt.

Porter's bed and quoin has been adopted for all carriages requiring them.

When the *elevating screw* is used, a quoin should be at hand to place under the breech of the gun, when at extreme elevation, to relieve the screw from the shock of the discharge, and prevent a change of the elevation, as well as to take the place of the screw, if it should be disabled. When the fire is continuous at the same distance, the lever of the elevating screw should be secured by a laniard, to prevent the screw from turning and altering the elevation.

335. If a greater elevation for broadside guns should be desired for any special purpose, it may be obtained by placing inclined planes behind the rear trucks for them to recoil over, and produce a corresponding depression of the muzzle of the gun as it comes within the port. But it will be observed that beyond the elevation which the ports will admit of, the sights can no longer be taken by the tangent or any other top sight, as the upper sill of the port interferes. The gun must therefore be laid by the quoin and pendulum.

Additional depression may also be obtained by placing inclined planes for the front trucks to recoil upon, or by raising the breech by means of a wooden toggle placed vertically under it. One end of a tripping line is fastened to the middle of the toggle, and the other to the breeching bolt in the side of the ship; by this arrangement the toggle is tripped from its place at the commencement of the recoil, and the muzzle is raised so as to clear the port sill by the preponderance of the breech.

NINTH COMMAND.

"READY—FIRE!"

"Waits patiently for the coincidence of the sights upon the object."

236. The exact moment for firing, at sea, necessarily varies with circumstances; but when these are favorable the following general principles should govern:

337. When the ship is steady, the gun should be fired when the line of sight is brought upon the object; but when the ship has much rolling

motion, the moment for firing should be chosen a little before, so that the shot will probably leave the gun when the roll brings the line of sight upon the object aimed at.

When practicable, and too much time will not be lost, it will be best to fire when the vessel is on the top of a wave and just begins to roll towards the object. If the loss of time should be found objectionable, the gun may be fired at any other instant, when properly pointed, giving a preference, however, to the moment when rolling *towards* rather than when rolling *from* the object, and making due allowance for the probable change of elevation by the roll of the ship, before the shot leaves the gun.

338. If, from *any cause*, the firing should be delayed after the gun has been pointed, it should be carefully pointed again before the order to fire is given.

339. The great object is to fire *low enough* to strike the hull, if the shot preserve the *intended* direction, and as a general rule to strike it near the *water-line*.

340. To avoid loss of shot from lateral deviations, it is recommended to direct all the guns to be pointed to strike somewhere between the fore and mizzen masts of an enemy; when quite near, the guns of the forward divisions should be pointed in preference to that part of the hull about the foremast, and one or two of the after guns at the rudder, if it should be fairly exposed.

REMARKS ON THE DIFFERENT KINDS OF FIRING.

341. *Firing at will.*—By this is meant firing the guns independently of each other, each Captain of a gun seizing the most favorable opportunity. This firing should always be used in action (unless ordered to the contrary) whenever the object is visible, the smoke from one gun not greatly impeding the firing of another.

342. *Firing in succession.*—By this is meant firing one gun after another in regular order, commencing from the foremost or after gun, according as the wind is blowing from *aft* or *forward.* This firing may be used with advantage in the commencement of an action, or whenever a *continuous, steady fire* is desired, as the smoke from one gun will not impede the firing of the next.

343. *Quick firing.*—By this is meant rapid firing at will, the tangent sight not being raised. This firing should be used when close alongside an enemy, as then but little pointing would be required.

344. When the guns are laid for the projectile to strike the object aimed

at without grazing between the gun and the object, the firing is said to be *direct*. This mode of firing is to be preferred when the object fired at is so near that the chances of hitting it are very great, and also when the intervening surface between the gun and object is so rough or irregular that a projectile striking it would have its velocity much diminished or destroyed, and its direction injuriously affected.

Direct firing requires a good knowledge of distance, and precision both of elevation and lateral direction, in order to strike an object which is comparatively a point.

345. When the guns are so laid that the projectile makes one or more grazes between the gun and the object, and continues its flight, the firing is denominated *ricochet*.

Ricochet firing, upon a smooth surface within certain distances, has some important advantages over direct firing. When the guns have very little or no elevation, and are near the water, as they are in a ship's battery, the projectile strikes the water at a very small angle; its flight is very little retarded by the graze, and it rises but little above the surface in its course.

Ricochet firing at low elevations requires only correct lateral direction, since the projectile would rarely pass *over* and would probably strike a vessel if within its effective range, whether the actual distance had been correctly ascertained or not.

The deviation of projectiles is, however, generally increased by ricochet, and in proportion to the roughness of the surface of the water. Even a slight ripple will make a perceptible difference not only in direction, but in range and penetration, and the height to which the projectile will rise in its bounds.

Although these facts demand attention, yet when the estimated distance does not require an elevation of more than three degrees, projectiles from guns pointed rather too low for direct firing will probably ricochet and strike the object with effect, even when the water is considerably rough.

When the water is not smooth, the most favorable circumstances for ricochet firing are when the flight of the shot is with the roll of the sea, and the sea is long and regular.

Ricochet will be effective against small objects up to 2,000 yards, but should not commence before 600 yards; at less distances it is preferable to fire direct. Ricochet is of no value from rifled guns firing elongated projectiles, as they lose all certainty of direction on the rebound.

Upon *smooth* water, a shot fired horizontally from the 32-pdr. of 33 cwt., with 4½ lbs. powder, ricocheted and rolled about 3,000 yards; the greatest range obtained from an elevation of 5°, with the same gun and charge, was less than 1,800 yards. (*See Dahlgren's Report on 32-pdr. of 32 cwt., p. 90.*)

Shot rarely ricochet at all with elevations above 5°, and the bounds are always higher, with equal charges from the same gun, as the elevation of the gun is increased.

346. *Concentration of fire* may be desirable under certain circumstances; and arrangements have been sometimes made to secure it by the simultaneous discharge of a number of guns upon some part of an object whose distance is known.

The advantages of these arrangements are not very obvious, excepting in cases where the position of the enemy may be visible from one part of a ship and not from all the guns in the batteries. Even in these cases, however, it requires that all the guns which are to fire in this manner should be regulated by one gun, and all be fired at the same time, which it would be difficult to accomplish; and, if successful, the simultaneous discharge from many heavy guns may be considered objectionable.

Concentration of fire upon a particular part of an enemy's vessel may be obtained by a general order for the guns to be aimed to strike that part, leaving the Captains of guns to determine the proper time for firing, according to circumstances at the moment. This obviates the objections due to simultaneous firing, and would generally be equally effective. In this, as in all other cases at sea, success would depend mainly upon the skill, judgment, and coolness of the Captains of the guns.

THE USE OF FUZES.

347. All spherical shells, except the 24 and 12 pdr. howitzer and all shrapnel, are fitted with the "navy time fuze."

This fuze is composed of a composition driven in a paper case, and then inserted in a metal stock, which screws into a bouching fitted to the shell.

The composition is covered with a "safety cap," which protects it from moisture and accidental ignition; also with a *water cap* of peculiar construction, intended to protect the flame from being extinguished on ricochet.

A "safety plug" at the lower extremity prevents the communication of fire to the powder in the shell in the event of the accidental ignition of the fuze after being uncapped.

348. It is strictly forbidden to show to, or explain, to foreigners or others the construction of any fuzes, except so far as may be necessary for the service of the guns.

349. These fuzes are of 3½, 5, 7, 10, 15, and 20 seconds time of burning; which is supposed to offer a sufficient variety for most of the exigencies of service. There are also supplied paper-case fuzes of greater length.

All shells are fitted and issued from the shell-houses, with the 5″ fuze, which is to be regarded as the general working fuze.

For greater or less distances this fuze may be drawn and any of the others substituted.

The navy time fuze is rarely extinguished by several ricochets on water; and near the end of its flight, when fired direct, frequently acts by concussion.

The fuze used should not be of longer time of burning than requisite to reach the object; the shorter time are of quicker composition, therefore more certain; also in firing on ricochet the shell may sink short of the distance necessary for its explosion, and consequently supposed to fail.

350. For special firing, as for example, at masses of uncovered troops, any of these fuzes may be shortened. To do this, unscrew the water cap, and back the paper case out from the lower end with a drift and mallet; cut off from the lower end with a fine saw, or sharp knife struck with a mallet, the proportional part required, and insert the upper part in the stock, forcing it down with a few gentle blows with the drift; screw on the water cap.

351. The Borman fuze is fitted to the 24-pdr. and 12-pdr. howitzer ammunition, and all shrapnel. It has also been fitted to certain shells used for special firing. The length of fuze is the limit of the distance within which this fire is effective.

This fuze is cut, or rather opened, at the required number of seconds, cutting close to the right of the mark on the index plate. The cut should be made down to the plane of the table, in order to expose the composition, and is best made at two or three efforts instead of trying to effect the cut at once. This fuze should be carefully explained, as shells have been taken from guns with the cut made into the priming magazine, which would explode them at the muzzle.

352. There are also on trial for the rifled cannon the "percussion" and 'time" fuzes of Shenkle, Hotchkiss, Parrott, and others.

353. These fuzes will be exhibited and explained by the Ordnance Officer on the application of Commanders of vessels, who, with the Executive Officer and Gunner, are enjoined to make themselves thoroughly acquainted with this most important part of their equipment.

354. Commanders of vessels will carefully note and report the efficiency

of all fuzes fired in action or exercise; giving the elevation of the gun, the estimated or measured range, the number fired, the name of the inventor, whether "percussion" or "time," the number of failures to explode the shell, premature explosions, and satisfactory action. Great waste of ammunition is frequently occasioned by an under estimate of the distance.

355. The times of flight and length of fuze for all projectiles, so far as ascertained at the Experimental Battery at Washington, are given in the table, Appendix B.

356. The best effect of a percussion fuze is obtained by firing into a mass of timber. They frequently fail if fired into a bank of soft earth, or other material which does not offer a sufficiently sudden resistance; also if fired at high angles of elevation, owing to the fact that the shells do not generally strike point foremost.

357. Time fuzes are also very unreliable in rifle guns, owing to the fact that the expanding class of projectiles cut off the flame from the fuze.

DIRECTIONS IN CASE OF FIRE.

358. In the following directions no other object is proposed than to notice some of the more prominent and common preparations which may be generally made, and the means to be adopted in vessels, on the alarm of fire; but without expecting to meet all the varieties which that danger may present, and which can only be successfully met by properly stationed, well-trained, and well-disciplined men, judiciously directed by the Captain and superintended by officers whose coolness and presence of mind are proof against every form and degree of danger, and such as will enable them to adopt and preserve the best measures which the emergency may require.

To this end the Captain will, as soon as the crew is organized, cause a FIRE-BILL to be prepared, adapted to the particular circumstances and arrangements of his ship, and in accordance with these directions, by which the crew is to be drilled once a week till expert, and after that occasionally. This fire-bill should, as far as possible, conform to the arrangement for extinguishing fire during exercise. Much confusion has been known to arise from requiring different duties from the same person at *Fire Quarters*, and in case of fire when at *General Quarters*.

359. Should the alarm of fire be given when the men are not at quarters, that alarm of itself is to be considered as a call to quarters, and the men are to repair to their stations at once. (This shall be impressed upon the men by the Division Officers.) But the ordinary call as for inspection is to be given as soon as practicable, by way of enforcing the order.

The alarm will be given by the sentinel near the bell, by ringing quickly and loudly successive peals of ten or fifteen seconds, with short intervals between.

The bell is to cease, however, as soon as the drum begins to sound the call to quarters.

Should it be deemed necessary to water and provision the boats, preparatory to lowering them, the drum will beat the usual call for provisions, when the men stationed for these purposes will promptly proceed with their duties. In this case the shot will be drawn or discharged from the guns, to guard against accidents in leaving the ship, should it be impossible to save her.

360. The Captain will direct the Executive Officer, and such others as he may deem proper, to visit the seat of the fire, and to transmit reports to him, by officers, of its character and extent, and to suggest the measures which will most speedily and certainly subdue it, or prevent its extension to more dangerous parts of the ship.

361. He will, if at sea, cause the ship to be hove-to, or steered in such direction as will be least likely to increase the activity of the fire, or will best enable the men to use the means in their power for controlling and extinguishing it.

362. If fire should take place in a ship at anchor in a port or harbor, his attention must be given to prevent the communication of the fire to other vessels or combustible objects, and to have the cables ready for slipping, and boats ready, and, if advisable, springs prepared, to change the position of the ship, either to prevent danger to other vessels, or better to apply the force for suppressing the fire.

363. He will decide whether and when the magazines and shell-rooms shall be flooded, and give orders accordingly; whether hammocks should be brought up and stowed; when and where sentinels should be placed, and what disposition shall be made of the sick and of the prisoners.

If the hammocks are to be brought up, each man not a Fireman, Pumpman, Hoseman, Axeman, or Smotherer, or belonging to the Carpenter's gang, or detailed as a Sentinel over boats' falls or spirit-room, will lash and carry up *two* hammocks and stow them in the nettings, on his way to quarters. Blankets, or other woollen materials, when wet, afford an excellent means of smothering fire, and should be left out by the party lashing up the hammocks and collected by the Smothering party, in charge of an officer, whose duty it will be to see them properly disposed of.

364. The Officers of the respective divisions will enforce the strictest observance of orders from those under their command, and allow no one to leave his station, unless by express orders or permission. At the same time they will direct the most trustworthy of their men to perform any particular duty within their divisions which may tend to check the spreading of the fire, or furnish the means of extinguishing it.

365. Officers of gun-deck divisions will be prompt to detach, under proper officers, the men who may be directed for any particular service, or who may be called from the guns by the calls for Firemen, Sailtrimmers, or Boarders. Should the call for Boarders be made in case of fire, the men will answer the call without any other arms than their swords or battle-axes. Divisional Officers near the main or other pumps, will cause the men of their divisions to aid in rigging and working them. The ship's buckets are to be passed up to the pumps, as soon as possible, by the persons who may be stationed near them, and these and the fire buckets and division tubs filled. The swabs are also to be got up and thoroughly wetted.

Division boxes, and all powder or explosive materials not in the magazines, are to be taken in charge by the Quarter Gunners and placed in the safest positions, and ready to be thrown overboard, if ordered.

366. The Officer commanding the Powder division will himself deliver the keys of the magazines, shell-rooms, and water cocks to the Gunner and his Mate, and the men stationed at the water cocks, and see that they are prepared to flood the magazines, if orders should be given to that effect; but must take especial care that the magazines, passages, and shell-rooms are kept closed until orders to open them are received from the Captain.

367. He will also take care that the air ports are immediately closed, and all other means adopted for diminishing currents or supplies of air, and especially if there should be a hope of confining the fire to the lower parts of the vessel.

He will at once have the hose led from the bilge cock, the cock turned, and, if the forcing pump or engine is worked below the gun deck, will see it manned and worked by some of the men of his division.

368. The Master will cause windsails to be taken down; and, if set, courses spanker and all lower sails hauled close up; head, channel, and all other pumps which work on upper deck, and fire engine, if on deck, to be rigged and worked by the men of his division stationed nearest to each of them. If practicable, sails, rigging, boats, spars, and sides of ship to be kept wet, and every exertion made to furnish a full supply of water for extinguishing the fire. Rigging-axes and battle-axes to be ready for use in case they should be wanted for any purpose.

369. The Chief Engineer will detail such Assistant Engineers and men as may be needed to take charge of steam pumps, to lead out hose, and to use such other means of extinguishing the fire as may be ordered or deemed advisable. If under steam the main engine will be stopped on the first alarm of fire, unless otherwise expressly ordered, and the steam pumps started.

370. The Surgeon and his assistants will be in readiness to destroy, if required, all inflammable fluids, or other medical stores, which would increase the fire; and to superintend the removal, if necessary, of patients who may be lame or confined to hammocks.

371. Exercises, by order of the Captain, following *false alarms* of fire, known only to him and the Executive Officer to be false, at the time of giving the alarm, may, it is believed, be resorted to with advantage, especially at night.

Such alarms furnish the best means of ascertaining practically whether the necessary preparations for extinguishing fire have been duly attended to, and what degree of silence, calmness, and promptitude may be expected from officers and men in repairing to their stations, as well as in the performance of their duties in a real case of fire.

False alarms, frequently repeated, may, perhaps, lead some of the men to move slowly, under the impression that every alarm given is false and merely intended for exercise, and this impression may be entertained even when a fire has actually taken place. This evil would, however, be comparatively small, since it will be readily admitted by any one who has witnessed the effect of a fire upon a crew at sea, that the great difficulty in such cases is to obtain the necessary quiet and orderly attendance at quarters, which is essential to the success of all subsequent measures.

CHAPTER V.

MISCELLANEOUS OPERATIONS.

GETTING IN GUNS ON COVERED DECKS.

372. After bracing the yard over the port through which it is intended to take the guns, secure the lizard round the yard, five or six feet outside of the ship, and hook the top burtons just outside of the lizard.

Haul taut and bring an equal strain on the burtons and lifts. Hook a rolling tackle on the opposite side of the yard, bowse it well taut, and the trusses also, if they be of rope. Pass the end of the pendant of the gun-purchase through the thimble of the lizard; take the end up and make it fast round the top-mast, just above the lower cap. Have the port lined with pine boards, to keep it from being chafed.

Bore a hole in the deck or decks through which it is intended to pass the gurnet, as nearly as possible over the rear end of the gun-carriage, and as near in line with the centre of the port into which the guns are to come as the beams will allow. Pass the upper end of the gurnet through the hole, and turn in the thimble, to which hook the pendant tackle. Place a tackle across the deck ready for bowsing the gun into its carriage through the port.

Bring the gun under the yard and sling it as follows: place one bight of the slings under the neck of the cascabel, and pass the lashing which is attached to the slings round the chase, at such a distance from the trunnions as will allow them to go into the trunnion holes without bringing too great a pressure of the slings against the upper port sill. Then toggle or hook the gun-purchase to the outer bight of the slings and sway away. When the breech of the gun is above the port sill, hook the gurnet and the thwart-ship tackle to the cascabel, and bowse on both. When the slings bear hard on the upper port sill, lower the gun-purchase, and bowse on the gurnet until the breech is high enough for the trunnions to clear the cap-square bolts in the carriage; then bowse on the thwart-ship tackle until the trunnions are over the trunnion holes, lowering the purchase as required to bring the gun into its place.

As each gun is mounted unhook the purchase and gurnet, take off the slings, run the carriage to its proper port, and place another for the next gun.

TAKING IN GUNS OVER ALL.

373. Sling the gun slightly breech-heavy, to render it more manageable. If it is to be mounted on the spar deck, place the carriage in the gangway; if on the main deck, close to the main hatchway on that deck. In place of the urnet, hook the stay-purchase for lowering the gun into its carriage.

GETTING OUT GUNS THROUGH PORTS.

374. Secure the yard as in getting in guns, and sling the gun in the same manner. Hook the gurnet and haul it taut, so as to raise the breech of the gun as much as the port sill will permit; hook or toggle the gun-purchase and sway away. As soon as the trunnions are clear of the carriage haul it from under the gun, ease away the gurnet, and let the gun go out the port. As soon as the gun is perpendicular to the purchase, unhook the gurnet and lower the gun into the lighter, or on the wharf, as the case may be.

If the gun is to be taken out *over all*, the stay tackle is to be substituted for the gurnet, only it is to be hooked to the same end of the slings as the gun-purchase, and the lashing on the slings is to be passed around the chase of the gun, as near the trunnions as possible, without being in the way of the brackets.

MANNER OF USING THE GRIOLET PURCHASE FOR DISMOUNTING OR MOUNTING GUNS ON COVERED DECKS.

375. The gun is to be run in, in the direction required to bring the muzzle under the housing bolt, and the breech under the hole bored in the deck to receive the screw bolt of the upper block of the breech-purchase. This hole should be bored through the plank in the deck, as nearly abreast the middle of the port as the beams will allow, giving the block room to play clear of the beams and carlings.

With a gun's crew of twelve men the operation may be performed as follows:

At the word "Stand by to dismount!" the Quarter Gunner of the division on the deck above that in which the gun is to be dismounted removes the screw tap, and stands ready to place the washer, key and unkey the bolt of the breech-purchase block.

All the numbers, except 1, 2, 3, and 4, man the train-tackle.

No. 1 gives the word "*Run in!*"

While the gun is coming in, Nos. 1 and 2 remove breeching from jaws of cascabel, and 7 and 8 remove it from side shackle. Nos. 1 and 2 throw its bight over the reinforce. No. 1 removes *sight-bar* and screws up the *thumb-screw firmly.*

When the gun is in position—Nos. 1 and 2 adjust upper and lower block of breech-purchase and secure the latter with the cascabel pin. Nos. 3 and 4 chock fore trucks, provide muzzle-purchase, and, assisted, if necessary, by 5 and 6, adjust its upper block. Nos. 5 and 6 unshackle breeching from ship's side, and shove toggle block of muzzle-purchase into the bore and back it to the breech-purchase.

Nos. 7 and 8 unkey and throw back cap squares and choke luffs of side-tackles, or, if rolling deeply, hitch them round the straps of the blocks.

Nos. 9 and 10 provide breech-purchase and assist 1 and 2 in adjusting it.

No. 11 chokes luff of train-tackle, or hitches it, if required; provides and hooks tackle of muzzle-purchase; belays and lowers.

No. 12 provides and hooks tackle of breech-purchase; belays and lowers.

These preparations made, all the numbers man the breech tackle fall, or divide themselves to bowse upon both falls together, as the position of the gun in the battery may render either mode most convenient.

At the word "Dismount!" the gun is swayed out of the carriage.

Nos. 3 and 4 attend chocking quoins, and 11 attends train-tackle, if required.

All the numbers, excepting 11 and 12, who attend purchase falls, move up to their ordinary stations for serving the gun, unhook side-tackles, and remove the old carriage, under the direction of No. 1; and—

At the word "Mount!" the same men bring the new carriage into position for mounting.

At the word "Lower!" Nos. 11 and 12 lower the gun into its place; all the numbers then proceed, respectively, to reverse what they had done in dismounting.

Guns on covered decks may also be dismounted by means of a muzzle lashing, the runner, and the train-tackles, assisted by the handspikes.

The gun is run in and laid square under the housing bolt, the bed and quoin removed, the muzzle elevated and secured as in the housing position; then, after unkeying and throwing back the cap squares, the breech is bowsed up clear of the carriage by means of the train-tackle, hooked in the eye of a runner, the block of which hooks in an eye-bolt in the beam over the gun. If preferred, this mode of dismounting may be adopted by substituting the muzzle lashing for the toggle block of the griolet, and toggling the runner block in the hole made in the deck for the breech-purchase of the griolet.

THROWING GUNS OVERBOARD.

376. The gun's crew being assembled at quarters, remove the pin and chock from the cascabel, into the jaws of which place a selvagee strap; hook the double block of the train-tackle into the housing bolt over the port, and its single block into the selvagee strap; remove the cap squares, and place a round block of wood on the sill of the port, high enough to let the chase bear on it when slightly depressed; raise the breech as much as possible, without lifting the gun out of the carriage. When all is ready man the train-tackle well; have the handspikemen also ready to assist in raising the breech; and if the vessel is not rolling, it will be well to have additional handspikes under the rear of the carriage to lift it also, so as to give free egress to the gun. When all is ready give the order: "All together—launch!" In a gale of wind advantage should be taken of a favorable roll to give the word, that the action of the sea and of the men at the guns may be simultaneous.

If the guns are to be thrown overboard for the purpose of lightening a ship which is aground, they must be buoyed, and care is to be taken that each buoy-rope is of a proper length and strong enough to weigh the gun. The best mode of securing the buoy-rope to the gun is to form a clinch or splice an eye in the end which goes over the cascabel, and take a half-hitch with the bight around the chase of the gun, and stop it with spun yarn.

The buoy must be sufficient to float the rope when saturated; or, in deep water, a smaller line may be used for the buoy, and attached to the rope intended for weighing the gun, that it may be hauled up when wanted.

CHAPTER VI.

RIFLED CANNON.

377. The rifled cannon at present in service are—

PARROTT.

Denomination.	Weight.	Charge.	Weight of shell.	Weight of shot.
	lbs.			
8-inch, or 150-pounder...	16,500	16 lbs. No. 7	135 lbs.	135 to 154 lbs.
6.4-inch, or 100-pounder..	9,700	10 lbs. No. 7	80 to 100 lbs.	70 to 100 lbs.
5.3-inch, or 60-pounder...	4,900	6 lbs. No. 7	50 lbs.	60 lbs.
4.2-inch, or 30-pounder...	3,550	3¼ lbs. cannon	29 lbs.	30 lbs.
3.67-inch, or 20-pounder..	1,750	2 lbs. cannon	18 lbs.	20 lbs.

DAHLGREN.

Denomination.	Weight.	Charge.	Weight of shell.	Charge.
	lbs.			
4-inch, or 20-pounder, bronze howitzer	1,340	2 lbs. cannon	18 lbs.	0.86 lb.
3.4-inch, or 12-pounder, bronze howitzer	880	1 lb. cannon	11 lbs.	0.50 lb.

378 CHARGES FOR PARROTT'S SHELL.

	X-in.	VIII-in.	100-pdr.	60-pdr.	30-pdr.	30-pdr.
		lbs. oz.	*lbs. oz.*	*lbs. oz.*	*lbs. oz.*	*lb. oz.*
Long	....	10. 13	5. 5	3. 4	1. 8	1.
Short	....	4. 13	3. 11	2. 2	....	....

379 SHELL AND SHOT GUAGES.

	X-in.	VIII-in.	100-pdr.	60-pdr.	30-pdr.	20-pdr.
Greatest..........	9. 95	7. 95	6. 36	5. 27	4. 17	3. 64
True diameter....	9. 94	7. 94	6. 35	5. 26	4. 15	3. 63
Least	0. 92	7. 92	6. 33	5. 24	4. 14	3. 61

380. In the rifle guns of Mr. Parrott it is intended to retain the full charge of powder which a smooth-bore gun of the same calibre would have with a round shot. The projectile for the rifled gun is to be usually ten times the weight of this charge.

To obtain greater initial velocity, projectiles of less than the full weight have been provided—solid shot of 70 pounds for the 100-pounder, and 135 for the 150-pounder, with the front end "*chilled.*" Such projectiles, though not suited for long ranges, will be effective at 1,000 yards or less, and are well calculated to act against oblique surfaces of iron.

381. For the 100-pounder gun the initial velocities have been determined as follows:

Charge.	Projectile.	Initial velocity.
0 lbs. No. 7 powder..................	Shell, 100 lbs.	1,250 feet.
0 lbs. No. 7 powder..................	Shell, 80 lbs.	1,380 feet.
1 lbs. No. 7 powder..................	Shell, 80 lbs.	1,405 feet.
0 lbs. No. 7 powder..................	32-pounder round shot.	1,829 feet.

382. The powder for the 8-inch, 100-pounder and 60-pounder, should be of No. 7:—for the smaller calibres, 30-pounder and 20-pounder, of navy cannon powder. The cartridge bags are the same as are prescribed for similar calibres of smooth-bore guns.

383. The Parrott guns have been arranged for the use of a certain kind of projectile, supplied by the inventor. These have reference not only to the calibre and mode of rifling, but to the design of the gun itself. For these reasons the inventor objects to the use of any other than his own form of projectile in the guns of his invention. This request has been acceded to. The shells of Shenkle and Hotchkiss have also been used.

It is not considered expedient to describe these projectiles, and it is therefore directed that the Commander, Executive officer, and Gunner shall make themselves thoroughly acquainted with their construction, and the percussion and time-fuzes issued with them, before sailing, the ordnance officer furnishing them with any information on these subjects in his possession.

384. The projectiles consist of shells, shrapnel, and solid shot. All rifled projectiles used in the navy are of the expanding class; that is, forced into the grooves by the action of the charge of powder, they require no other precautions in loading than common spherical shells.

385. It is, however, essential—

1st. That the base of every rifle projectile, especially the Parrott, shall be thickly greased before entering into the gun.*. For this purpose common pork slush, prepared by several washings in hot water, may be used.

2d. That the bores of all guns shall be frequently washed, the grooves of rifled guns cleaned of *all* residuum and dirt, and a ***moist sponge invariably used.*** After firing the bore should be oiled with a sponge.

The attention of commanding officers is especially called to this requirement; and the bureau desires that the action of Parrott's and other rifle projectiles fired under the above conditions, may be carefully observed and reported; for it is believed that nearly all the failures in actual service result from the grooves being filled, after a few rounds, with a hardened residuum of powder.

386. It is also necessary that the shell shall be close "home" on the powder, otherwise the necessary expansion will not take place, and the shell will tumble immediately after leaving the gun, utterly destroying its range and accuracy.

387. If, however, a considerable interval should be left between the charge and the projectile, the strain upon the gun would be greatly increased and it possibly burst. For these reasons the rammer handle should be marked to verify this important fact in case of any accident to the gun.

388. It is very important that dirt, sand, or other foreign substances should not be carried into the gun on the sponge or the projectile, or by the wind, in batteries on shore.

In using guns on shore a canvass muzzle bag or a soft wad, or tight stopper of wood, suggest themselves as a means of security during the interval between loading and firing the gun. The cover or stopper might be removed, or left to be blown away at each discharge.

The longer the interval above alluded to, and the higher the elevation at which the gun is kept, the more important will be the precautions here recommended.†

389. Much care is taken to give the projectiles uniformity of size, and if the powder is of suitable quality, those now supplied will almost invariably take the grooves. Should difficulty in this respect, however, be experienced from any cause, it may be remedied by separating the brass ring from the iron at three or four points of the circumference. This should be done with a cold chisel, very slightly, and not so as to interfere with the loading. It is only necessary to sever the contact of the two metals.

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* The Shenkle, Hotchkiss, and some other projectiles have a small quantity of grease attached.

† Mr. Parrott has furnished articles 388, 396, 398, 400; also the details relative to his guns.

390. It should be observed that the projectile slides in the gun with very little friction, particularly when greased. The gun should therefore be elevated and eased out when firing to leeward, that the shot may not be started from its seat. An experiment to test this, showed that running a 100-pounder out with the force of its crew against the forward heurter, the gun being level, started the shot forward nearly two feet. If the gun were fired with the shot in this position it would probably burst.

391. The 100-pounder and 150-pounder guns being, respectively, of the calibres of the 32-pounder and 64-pounder, spherical shot, and fired with the same charges, these shot may be fired from them with excellent effect, particularly on ricochet. The round shot should be sewed up in canvass, strapped to a sabot, or snaked between two gromet wads.

392. Both percussion and time fuzes are supplied for these guns. When the object to be fired at presents a sufficient resistance, such as masses of timber or earth, ships, or solidly-built houses, the percussion fuzes alone should be used from rifled cannon. They will, however, frequently fail to explode the shell at long ranges, owing to the shell not striking on its apex; or, if fired into loose earth, which checks its momentum too slowly to allow the plunger to strike with sufficient force.

393. It has been observed that "time" fuzes burn with greater rapidity in shell thrown from rifled cannon. Being in front they are subjected to greater pressure from the air. A similar effect is produced when the fuze is confined under a water-cap, as in the naval time fuze. Hitherto no reliable time fuse has been arranged for rifled canon.

394. The fuze holes of the heavy shells are cast larger than the diameter of the regular fuze stocks of the navy, which can, however, be used with the aid of a bushing ring, always sent with the shells.

395. If it be desired to explode the shell in front of or in the midst of a body of troops, or after having penetrated some resisting obstacle, the time fuze should be used. This is the only fuze to be used with shrapnel.

396. *The Vent* is made in a bouching of pure copper screwed into the gun. In the largest calibres the interior orifice is lined with platinum.

The upper portion of the copper in naval guns is replaced by steel to obtain a harder surface for receiving the blow of the hammer. The steel is three-fourths ($\frac{3}{4}$) of an inch thick.

A new vent can be readily put in after getting out the old one without injury to the screw thread. This can be done by boring out the bouching with a drill, which leaves a thin shell containing the thread. Into the hole thus made insert a square mandril about four inches, driving it lightly; by wrenching it a portion of the shell of the bouching can be detached and removed by *unscrewing*. This may be repeated, and the whole of the old copper removed. The screw thread is then to be cleaned out, and the new vent plug screwed in.

397. *Sights*—These consist of a fixed sight upon the right rim base, and a brass movable sight placed in a socket, which is screwed into the rear of the reinforce at the breech of the gun. The movable sight is furnished with a sliding eye-piece, and is graduated up to 10°. The eye-piece is also capable of lateral adjustment to allow for the drift up to 10°, and for the effect of the wind. It is desirable that the sights should be placed on both sides of the breech; otherwise, in firing from a port at extreme train, there is a considerable loss of lateral aim. Furthermore, with the sight on the right rim base, it is not convenient for the 2d captain to attend the screw without interfering with the aim.

398. These guns are all rifled to the right, by which it is understood that the upper surface of the projectile is made to turn from left to right, the observer looking from the breech towards the muzzle of the gun.

399. *Drift.*—This is a deviation caused by the direction of the rifling, and is always *to the right* when uninfluenced by the wind, and is always to be allowed for.

400. The *drift* is in practice confounded with the *deviation* produced by the direction and force of the wind, which may either annul or double it, according to whether it blows from right or left across the line of fire. At long range it is also necessary to consider the motion of the vessel across the line of fire. Suppose the vessel was moving at the rate of six knots, and the gun elevated to 15°, the time of flight would be by the tables, 18s., and the deviation arising from this cause would be upwards of 60 yards. It is therefore of great importance that the captain of the gun shall be carefully instructed in making this adjustment of the eye-piece.

401. *Elevating Screw.*—To obtain readily the changes of elevation necessary in the use of rifled cannon the heavier calibres are made with very small preponderance, and are supplied with an elevating screw which is attached to the carriage at the lower end, while the nut is connected with the cascabel of the gun. Both screw and nut admit of movements by which the screw can take any position required in the various degrees of elevation. The parts should be allowed a certain amount of "*play;*" if binding is prevented, it is believed that the evident advantages of the screw may always be obtained.

402. *Ranges and time of flight.*—So far as ascertained, are contained in Table VII, Appendix B.

403. *Exterior dimensions of boxes containing Parrott's projectiles.*

	Long.	Wide.	High.
	Inches.	*Inches.*	*Inches.*
VIII-inch .... 1..	25	10	10
160-pounder, long and short .... 1..	21½ & 18¾	8¾	8¾
60-pounder	....	....	....
30-pounder, containing .... 10..	25½	11	15¾
20-pounder, containing .... 10..	25½	10½	13

404. *Hotchkiss' projectile for 20-pounder and 12-pounder howitzer.*

20-pounder, containing .... 5..	24	12	6½
12-pounder, containing .... 10..	20	9	9

405. *Shenkle's projectile for 20-pounder and 12-pounder howitzer.*

20-pounder, containing .... 5..	24	14	7
12-pounder, containing .... 10..	22½	9½	11½

406. *J. A. D. projectile for 20-pounder and 12-poander howitzer.*

20-pounder, containing .... 3..	15	12½	7
12-pounder, containing .... 5..	19	10½	6

PART II.

EQUIPMENT AND MANŒUVRE

of

BOATS.

EQUIPMENT AND MANŒUVRE

OF

BOATS.

EQUIPMENT OF BOATS,

WHEN DIRECTED TO BE MANNED AND ARMED FOR SERVICE.

1. Boats are to be provided according to the time they are to be absent, and the nature of the service they are to perform, keeping in view the details prescribed in table, (*article* 5.)

The number and class of Boat Howitzers are to be as assigned by the Bureau of Ordnance.

2. When boats "manned and armed" are ordered, the Officers assigned to the command of the boats will see that they are thus furnished, or otherwise, as may be specially directed, and report when the boats are ready. They will also see that all articles are safely returned, or duly accounted for, when the boats return to the vessel.

If the boats are directed to assemble alongside of any particular vessel the officers are to report as they arrive there. If signalled alongside of the ship of the Commander of the Squadron for *exercise*, or for *inspection*, they are to be inspected, if he shall so direct, by an Officer appointed by him, whose duty it shall be to report those which may be particularly well prepared, and those which he may find deficient in equipment of arrangement, specifying particulars.

3. Whenever the Howitzers are to be used in boats they are to be fitted for the purpose as directed in "Exercise and Manœuvre of Boat Howitzers." Their crews are to be armed with swords and revolvers.

4. For boarding parties, swords and revolvers, and rifles loading at the breech, with filled cartridge-boxes, are to be supplied.

5. TABLE OF BOAT EQUIPMENTS, ARMS, AND STORES FOR EXPEDITIONS.

Departments.	NAMES OF ARTICLES.	Line Ships and 1st class Screw Frigates.			All other Frigates.			Razeed Frigates and 1st class Screw Sloops.			All other Sloops and Brigs.		
		LAUNCHES.	1st and 2d CUTTERS.	3d and 4th CUTTERS.	LAUNCHES.	1st and 2d CUTTERS.	3d and 4th CUTTERS.	LAUNCH.	1st CUTTER.	2d and 3d CUTTERS.	LAUNCH.	1st and 2d CUTTERS.	3d CUTTER.
GUNNER'S.	Boat carriage, complete	1 ea.	1 ea.	......	1 ea.	1 to 1st	......	1	1	......	1		
	Field carriage, complete	......	1 ea.	......	1 ea.	......	......	1	....	......	1		
	Amunition chests, (various in size and contents)	Either one or all, as the nature of the service may require.											
	Ammunition pouches	One for each man of the field howitzer's crew, except Nos. 1 & 2.											
	Match rope (lengths)	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1	1	1 ea.	1	1 ea.	1
	Primers (tin boxes)	2 ea.	2 ea.	......	2 ea.	2 to 1st	......	2	2	......	2		
	Cartridges for bursting charges	One for each shell or shrapnel fitted with ordinary fuze.											
	Fuzes, spare, assorted as to time	In proportion to ammunition taken in each boat.											
	Spare lock, complete	1 ea.	1 ea.	......	1 ea.	1 ea.	......	1	1	......	1		
	Haversack for Captain of howitzer	One for each field gun.											
	Swords	One for each man in the boat.											
	Breech-loading guns	One for each man of the boat's crew.											
	Minie rifles	When extra men in the boat, one for each.											
	Revolvers	One for each man of the boat's crew.											
	Cartridge-boxes, filled	One for each rifle, breech-loading gun, and revolver.											
	Empty powder tank, as a magazine	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1	1	1 ea.	1	1 ea.	1
	Boat arm-chest	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1

TABLE OF BOAT EQUIPMENTS, ARMS, AND STORES FOR EXPEDITIONS—Continued.

Departments.	NAMES OF ARTICLES.	Line Ships and 1st class Screw Frigates.			All other Frigates.			Razeed Frigates and 1st class Screw Sloops.			All other Sloops and Brigs.		
		LAUNCHES.	1st and 2d CUTTERS.	3d and 4th CUTTERS.	LAUNCHES.	1st and 2d CUTTERS.	3d and 4th CUTTERS.	LAUNCH.	1st CUTTER.	2d and 3d CUTTERS.	LAUNCH.	1st and 2d CUTTERS.	3d CUTTER.
CARPENTER'S.	Masts and spars ....(set)	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1	1	1 ea.	1	1 ea.	1
	Cranes for spars and spare oars..........(set)	1 "	......	......	1 "	......	......	1	....	......	1	......	....
	Set of oars	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Spare oars for one thwart ....(set)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Boat hooks..	3 "	3 "	3 "	3 "	3 "	3 "	3	3	3 "	3	3 "	3
	Tools and artic'es for repairing damages (set fixed)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Bucket	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Tarpaulin	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
SAIL-MAKER'S	Sails.................................(set)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Awning..	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Tent awning (see drawing)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
BOATSWAIN'S.	Thrum mats for muffling oars...........(sets)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Hand grapnels	2 "	2 "	1 "	2 "	2 "	1 "	2	1	1 "	1	1 "	1
	Anchors	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Chain or rope for anchor.........(15 fms. long)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Marlinspike	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Spun yarn ....(balls of)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Grease..........................(pounds)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Fishing lines and hooks	Three lines for the larger boats and two for the smaller, with 1 dozen assorted hooks per boat.											

TABLE OF BOAT EQUIPMENTS, ARMS, AND STORES FOR EXPEDITIONS—Continued.

Departments.	NAMES OF ARTICLES.	Line Ships and 1st class Screw Frigates.			All other Frigates.			Razeed Frigates and 1st class Screw Sloops.			All other Sloops and Brigs.		
		LAUNCHES.	1st and 2d CUTTERS.	3d and 4th CUTTERS.	LAUNCHES.	1st and 2d CUTTERS.	3d and 4th CUTTERS.	LAUNCH.	1st CUTTER.	2d and 3d CUTTERS.	LAUNCH.	1st and 2d CUTTERS.	3d CUTTER.
MASTER'S.	Boat Compasses	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1	1	1 ea.	1	1 ea.	1
	Lead and line	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Spy-glasses	One for the senior officer of the boats belonging to each ship.											
	Ensign	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1	1	1 ea.	1	1 ea.	1
	Signals (sets)	One for the senior officer of the boats belonging to each ship.											
	Lantern	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1 ea.	1	1	1 ea.	1	1 ea.	1
	Candles (pounds)	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
	Tinder box, with flint and steel	1 "	1 "	1 "	1 "	1 "	1 "	1	1	1 "	1	1 "	1
YEOMAN'S.	Boat Stove and utensils for cooking (set)	1 "	......	......	1 "	......	......	1	....	......	1	......	....
MASTER'S.	Fuel (quantity)	As may be judged necessary.											
	Breakers of water (number)	To be regulated, like the fuel, according to the nature of the expedition and ballast required.											
PAYMAST'RS	Provisions	Do...do...do...do.											
SURGEON'S.	Articles for treatment of sick and wounded	Do...do...do...do.											

DETAILS OF THE FOREGOING TABLE.

FIXTURES IN BOATS FOR BOAT GUNS.

6. Two eye-bolts on each bow, to receive the hooks of the skid; two cross pieces, of yellow pine, to bear the carriage, so as to carry the muzzle of the howitzer just above and clear of the gunwale and stem.

One piece of yellow pine scantling, placed lengthwise and amidship morticed into the rear cross piece, to sustain the carriage in sweeping.

MOVABLE PIECES.

7. Six pivot plates and bolts—one at the stem, one at the stern, one at each bow, and one on each quarter; two light wooden tracks to lay along the thwarts for the wheels of field carriages and the slide of boat carriage; one midship wheel track for the trail of field carriage; two stout skids, each fitted at one end with two hooks, and connected at the shore end by an iron brace.

The chocks with rollers at the stem and stern posts of launches, are arranged to be removed when the gun is to be used.

8. *Implements for shifting the Howitzer from boat to field carriage.*

One muzzle block.
One selvagee strap.
One shifting spar.
One short iron or wooden bolt, to keep the piece on the right slue.

9. *Implements, complete, for serving and working the Howitzer.*

Breeching for boat gun, (if deemed necessary.)
Lock with lock-string.
Elevating screw.
Sight.
Priming-wire.
Boring-bit.
Vent-cloth.
Sponge and rammer.
" " spare.
Spring spike.
Rat-tail file.

Haversack, with strap, for Captain of howitzer, to contain a supply of primers, spare fuzes, spare lock, vent-bit, vent-cloth, and implements for spiking; leather ammunition pouches for each of the men of the field gun, except Nos. 1 and 3, to be supplied by the Quarter Gunner, with one round of ammunition each, and two primers, when the order to land is given.

Drag rope, fitted with hooks and handles.

Trail handspike.

A rope, or chain, to lock the wheels in descending slopes.

Transporting boxes.

10. AMMUNITION.

A chest containing shrapnel.
" " shell.
" " canister.

These chests are of two sizes; the single, holding nine, and double, eighteen rounds.

A key is becketed to each box for unscrewing the lid.

Cutting tool for *opening* the Bormann fuze.

FOR SMALL ARMS.

11. Cartridge boxes and belts, furnished with cartridges and percussion caps, screw-driver, cone-key, and wiper.

An empty powder tank for magazine, to contain filled cartridge boxes and spare cartridges.

SMALL ARMS.

12. Breech-loading guns, in loops or brackets, under the gunwale of the boat, protected by a water-proof canvas covering, running round the rising of the boat.

Rifles.

Revolvers.

Swords.

Boat-arm chest.

A good tarpaulin to cover ammunition, &c.

13. PROVISION.

Pork. (To be cooked if there be time.)

Bread, in water-proof bag.

Cheese.

Fresh water, in kegs; always to be used for ballast when ballast is required.

Fuel and kindling.

14. UTENSILS AND ARRANGEMENTS FOR COOKING.

Launch stove and utensils.
Mess kettle.
Tin pots and spoons.
Funnel.
Bucket.

15. TOOLS AND ARTICLES FOR REPAIRING DAMAGES.

Axe, 1 for each boat.
Hatchet, " "
Hammer, " "
Hand saw, " "

Nails, 2 pds. for each launch; 1½ pds. for each large cutter; and 1 pd. for each of the rest.

Sheet lead, 3 square feet for each launch; and 2 square feet for each cutter.

Tacks, (number,) 100 for each launch; 75 for each large cutter; and 50 for each of the rest.

Marlinspike.
Spun yarn.
Grease.

16. MISCELLANEOUS ARTICLES.

Boat ensign.
Set of signals for boat of Senior Officer.
Boat compass.
Spy-glass.
Lead and line.
Lantern.
Candles.
Tinder-box, with flint and steel.
Fishing-lines and hooks.

17. FOR TREATMENT OF SICK AND WOUNDED.

Tourniquets.
Bandages.
Lint.
Medicines.
Surgical instruments.

18. BOAT GEER.

Masts.

Spars.

Rigging.

A set of oars, fitted with trailing lines long enough to allow them to trail alongside in the water.

Three boat hooks.

Spare oars, with trailing lines, for one thwart.

Cranes on the gunwale to hold spars and spare oars, raised sufficiently high above the gunwale (9 inches) to allow the oars to be got out or trailed. The spars thus arranged form a considerable protection against musketry.

Small thrum mats for muffling oars when required.

Anchor.

Chain, or rope.

Hand grapnels, fitted with a fathom of light chain, and five fathoms of line.

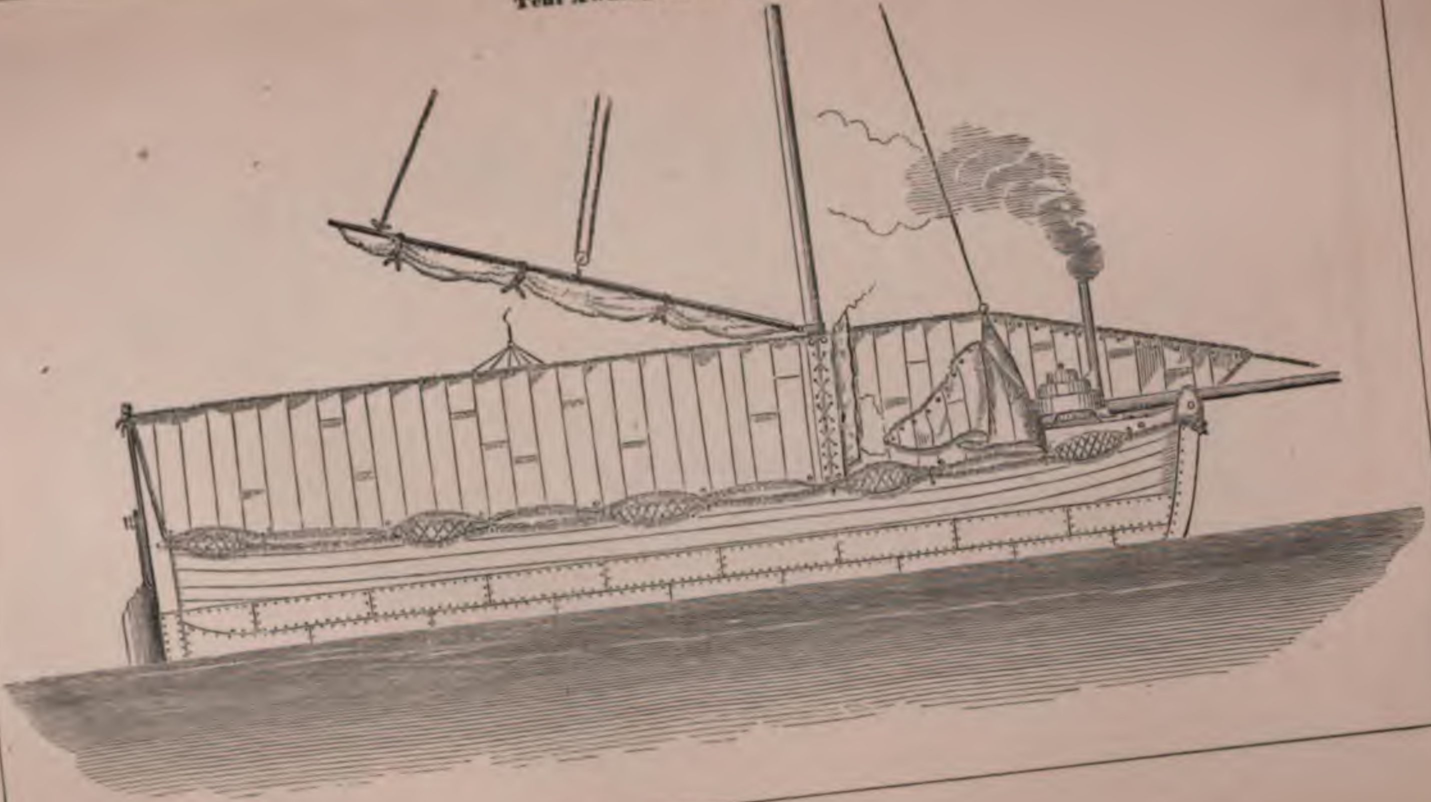
Sails.

Awning and stauncheons.

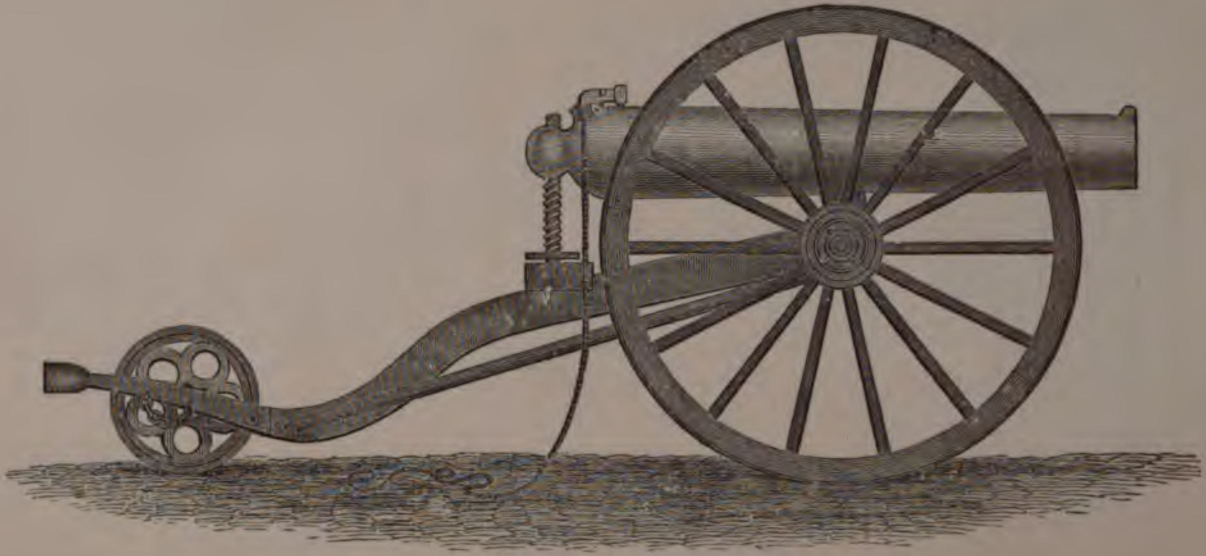
Tent awning. (See *Drawing*.)

N. B.—In order to avoid delay and confusion when boats are called away for service, it is recommended that the articles required by the foregoing lists should be kept separately in the store rooms, in convenient packages for stowage in the boats and protection against weather. The contents of each package should be marked on it, together with the name of the boat for which it is intended. Particular attention should be paid by the Executive Officer of the vessel to the best and most compact stowage of all articles required for boat expeditions, which will, necessarily, vary according to the size of the boat and the nature of the service she is to perform. The occasions will be very rare when all of these articles will be required at the same time.

Tent Awning for Launch.



HOWITZER ON FIELD CARRIAGE.



FORM OF EXERCISE AND MANŒUVRE.

FOR THE BOAT HOWITZERS OF THE UNITED STATES NAVY.

NOMENCLATURE.

19. **The Cascabel** is the part of the gun in the rear of the base ring; it is composed of—

—— The breech plate.
—— The knob.
—— The neck.

—— Base ring.
—— Cylinder.
—— Chase.
—— Loop, with hole for bolt.
—— Lock lugs.
—— Mass sight.
—— Mass for breech sight.

The **Bore** includes all the part bored out, viz:
Cylinder of bore.
Chamber.

These guns should not be rubbed bright, which might render it difficult to point them with a bright sun.

BOAT CARRIAGE COMPLETE, consists of—

—— Bed.
—— Slide.
—— Compressor plate.
—— " bolts.
—— " handles.
—— Lugs for loop.

FIELD CARRIAGE COMPLETE, consists of—

—— Axle.
—— Trail.
—— Braces.
—— Supports for transporting boxes.
—— Lugs for loop.
—— Trail wheel or runner.
—— Bolt for do.

—— Socket for handspike.
—— Elevator.
—— Disc of elevator.
—— Box for elevator.

EXERCISE OF THE BOAT-HOWITZER.

20. While preparations are in progress for clearing out the boats, the officer of the boat will see that the howitzer, and its various equipments, are also got in readiness. The junior Officer or Officer of the piece will attend to the gun itself and its carriages.

The Quarter Gunner will have the ammunition got up from below; also the lock, sights, sponges, spare fuzes, ammunition pouches, primers, &c. (Spare article box.)

This will be the proper occasion for examining the shrapnel and shells, which should receive the particular attention of the officer who is to command the boat.

The Captain of the gun will look after the traverses, tracks, pivot-plates, &c.

The Coxswain will have ready the thwarts, oars, masts, sails, &c.

When the boat has been cleared for hoisting out, lay the thwarts and traverses, bolt the pivot-plates on the bows and quarters; if the stem and stern pivot-plates interfere with the purchases, they can be secured after the boat is in the water. If the field carriage is to accompany the gun, lay the wheel and trail tracks.

In a sea-way, it may be better also to place the howitzer in the launch, laying it athwartships, and bolting the two ends of the slide into the bow pivot-plates, which will hold it perfectly firm.

As a general rule, the howitzer is not to be handled separately from one of its carriages. It may be hoisted into the launch on either field or boat carriage, as circumstances may dictate.

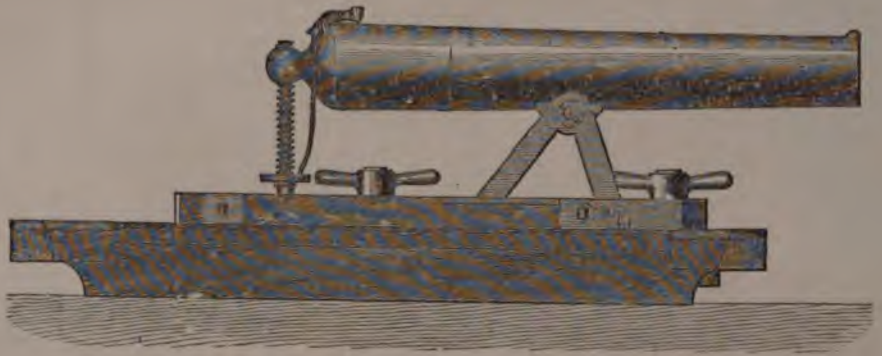
When the boat carriage is preferred, sling it with a stout strap passed through the loop-lugs and brought up round the gun, into which hook the purchase; previously shove the bed a little towards the rear end of the slide, so as to have the carriage hang square, and set the compressors tight.

When the boat has been hoisted out, the howitzer, its ammunition, and equipments, will be stowed in it conformably to the requirements of the occasion.

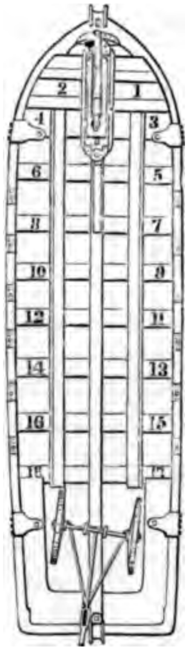
Supposing the arrangements to be of a general character, and to be adapted, subsequently, to the service as circumstances may require.

The howitzer may be in the bow on its boat carriage, bolted to the stem pivot.

HOWITZER AND BOAT CARRIAGE.



Stations in Boat.



The field carriage aft, the wheels resting on the floor of the stern sheets and bearing against the after thwart; the trail laid over the quarter rail, so as not to interfere with the steering.

The ammunition can be stowed in the stern sheets, or elsewhere, as may be most convenient for trim of launch, or for its own preservation.

The Captain of the howitzer slings his haversack, and deposits in it a supply of primers, a vent bit, and vent cloth, which are handed to him by the Quarter Gunner.

The equipment of the boat will be much facilitated by assigning to each man special duties of preparation and providing articles.

As the bow oars cannot well be pulled when the howitzer is mounted in the bow, Nos. 1 and 2 do not ordinarily assist at the oars.

STATIONS,

21. The stations in the boat and at the howitzer will be as follows, for 20 men; if fewer are employed, the higher numbers are to be omitted:

BOAT.		HOWITZER.
Stations.		*Duty.*
Quarter Master,	Stern Sheets.	Signals and assists with ammunition
Quarter Gunner,	Ammunition.	Ammunition.
Coxswain,	Helm.	
Chief of Piece,	Bow.	Superintends the firing.
Port.	*Starboard.*	
1. ———	Bow oar.	*Captain of howitzer*, points and fires the gun, superintends orders, and gives orders in absence of an officer.
2. Bow oar.	———	*2d Captain*, tends vent and primes.
3. ———	2d oar.	*Sponger*, sponges and rams home charge.
4. 2d oar.	———	*Loader*, receives and enters ammunition.
5. ———	3d oar.	Tends forward compressor.
6. 3d oar.	———	Tends after compressor.
7. ———	4th oar.	Train rope.
8. 4th oar.	———	
9. ———	5th oar.	

	BOAT. *Stations.*		HOWITZER. *Duty.*
10.	5th oar.	———	
11.	———	6th oar.	
12.	6th oar.	———	
13.	———	7th oar.	
14.	7th oar.	———	
15.	———	8th oar.	
16.	8th oar.	———	
17.	———	9th oar.	Run field carriage forward when landing.
18.	9th oar.	———	Run field carriage forward when landing.

Officer of launch directs the whole operations, or may take especial charge of the howitzer.

Officer of the gun is in command of the piece, unless otherwise ordered by the officer of the boat.

(Preliminary Order)—MAN THE HOWITZER.

22. The Captain of the gun is to see that the elevator, sight, and lock are in order for firing.

Nos. 1, 2, 3, 4, 5, 6, 7. Trail oars.

No. 3 goes to starboard side of muzzle, having the sponge and rammer ready.

No. 4 goes to port side of muzzle, takes out tompion.

No. 5 to starboard side, near forward compressor.

No. 6 port side, near after compressor.

No. 7 after end of slide, and hooks training-rope.

No. 2 tends the vent and puts in primer.

If the gun is unloaded, it must be run in.

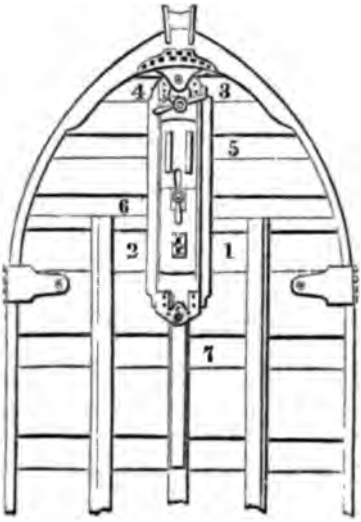
1. SPONGE.

23. No. 2 closes vent. (*a*)

No. 3 enters the sponge, and, pressing it firmly to the bottom, turns it round and withdraws it. (*b*)

Quarter Gunner takes a round from the ammunition-box, and, if shell or shrapnel be used, holds it for the officer in command of gun to adjust the fuze.

Stations at Howitzer in Boat.



2. LOAD.

24. Quarter Gunner passes forward with the fixed charge, protecting it under his jacket. (*c*)

No. 4 receives from Quarter Gunner and enters charge.

No. 3 rams home to the mark on rammer handle. (*d*)

No. 2 puts in primer and covers it with his hand until Nos. 3 and 4 are clear of the gun. (*e*)

3. POINT.

25. Nos. 5 and 6 ease compressors. (*f*)

All six men and Captain of gun run out the howitzer. (*g*)

Nos. 5 and 6 then tighten compressors.

Officer of gun puts up the sight as directed by Officer of launch. (*h*)

Captain of gun brings the elevation within the limits of the boat's motion.

And causes No. 7, with the assistance of some others, to train nearly to object if the boat is under way.

4. FIRE.

26. If the boat have motion, or is under way, a discretionary execution of this order is necessarily implied.

The assumed elevation having been given by the elevator, a slight motion of the helm is made to sweep the piece laterally, so as to cross the object.

The Captain of the gun closely watches this movement, with his eye down on the sights, and holding the lock laniard firmly, draws as soon as the sights coincide with the object.

Immediately after firing he coils up the laniard and pulls from the vent any pieces of the quill that may remain, also enters the bit to clear it entirely through. (*i*)

NOTES TO THE FORM OF BOAT EXERCISE.

27. (*a*) The necessity of closing the vent is now a mooted question; as the operation itself is a slight one, having no appreciable effect in complicating or delaying the manœuvre of the gun, it is not deemed advisable to lay it aside in this "Form." The practice here shows that the most ready, and equally sure method, is merely to lay a piece of untwilled woollen cloth over the vent, and press it down with the hand, or else turn the lock on it, and hold that down.

(*b*) Too much care cannot be used in sponging, as a premature explosion endangers life and limb; a moist sponge is to be preferred, for contact with it must surely extinguish every trace of fire in the bore.

It may be considered a safeguard against accident, if the absence of a single instance of the kind, in several years' practice, can be admitted as evidence; during this time the habit has been, in proving pieces, and exercising the men, to fire rapidly—ordinarily, seven or eight times in a minute.

(*c*) The head of the fuze composition must be guarded against moisture from the fingers, rain, or spray of the sea; otherwise, there will be a failure to ignite.

(*d*) The ammunition is never to be struck with the rammer-head, but pushed home, and with very moderate force; particularly omitting a very common practice of forcing the charge after it reaches the bottom of the bore. In ramming home the charge, No. 2 should always keep his body at the side of the chase, not before the muzzle.

(*e*) It is not necessary to pierce the cylinder of the charge when percussion primers are used; their power being always sufficient to pass through it.

(*f*) It is only necessary to give the compressors a turn, or a part of a turn; this will relieve the compression completely, and time is saved subsequently in compressing.

(*g*) Some will take hold of the standard of the carriage-bed that receives the loop of the piece, others of the breech or bed, as may be convenient, to run out the gun.

(*h*) In tightening the thumb-screw that retains the breech sight in position, do not turn it too hard; the thread may be stripped by continuing to do so. The sight may descend by the shock of the discharge, but this is of no moment.

In point-blank firing, the breech sight is not required; the eye must then range along the cylinder and muzzle sight.

(*i*) The charge may refuse fire; if this arises from not properly drawing the lock, it will be evident at sight, as the wafer of the primer will not flash, in which case No. 2 will throw back the lock.

If the primer explodes without acting on the charge, care must be taken not to approach the piece too soon, as it may only hang fire, and the recoil will injure any one in the way of it. After a seasonable pause, the Captain of the howitzer will remove the residue of the primer, pass the bit down the vent, and insert another primer.

PIVOTING THE HOWITZER.

28. The sweep allowed by the stem pivot is about one point and a half starboard or port; if it is not sufficient to train the piece on the object,

without diverging inconveniently from the course or position of the boat, then the bow pivots may be used.

The Officer of the launch gives the order—

Pivot on the Port (or Starboard) Bow.

29. No. 7, with the assistance of the others, trains the rear end of the slide into the bow pivot which is *not* to be used. No. 2 bolts it in. No. 3 draws bolt out of stem pivot, and, with assistance, draws round the forward end of the slide into the pivot *to be used;* drops in the bolt. No. 2 withdraws the bolt from rear end of slide.

The sweep on the bow pivots include an arc of about 120 degrees.

It is not advisable to train the howitzer more than a point abaft the beam if forward, or more than a point forward the beam if aft; as the accidental explosion of a shell near the muzzle, and even of a shrapnel, might be dangerous to those in the boat.

On the bow pivot, the piece may be pointed nearly from the direction of the keel to a little abaft the beam.

SHIFTING THE HOWITZER.

30. If this does not bear on the object with such assistance as is admissible from the helm, then the Officer of the launch may direct the howitzer to be shifted to the other end of the boat.

The light 12-pounders, with their boat carriages, average 660 pounds each; and can be transported by hand from one end of the boat to another.

With their boat carriages the 12-pounders of 750 average 1,200 pounds each; the 24-pounders about 2,000 pounds, and will probably be more conveniently managed, especially if the boat have motion, by placing rollers (2¼ to 2¾ inches in diameter) on the tracks laid for the field-carriage. On these the boat carriage can be shifted from one end to the other, using light falls at each end to keep it under command.

DISEMBARKATION OF THE HOWITZER.

1. Prepare to Land.

31. The Quarter Gunner fills the pouches or passing-boxes with one round each, and passes them to the men, each of whom, except Nos. 1 and 3, slings a pouch over the right shoulder, and buckles the strap as short as possible, so as to keep the ammunition clear of the water when leaving the boat.

The Captain of the gun also shortens the strap of his haversack.

Trail Bow and Stroke Oars.

32. Nos. 1 and 2 will adjust the bed of the boat carriage to its proper place on the slide for shifting; place the muzzle-block, and make the muzzle

bear on it by means of the elevator; pass the strap around the neck of the cascabel, and put the shifting-spar through the strap; the Quarter Gunner, assisted by the men from the after oars, raises the field carriages up on the tracks.

2. Trail.

33. The boat being beached in season, the men trail their oars and jump to their stations.

Nos. 3 and 4 over the bow to adjust the skids, which are launched by Nos. 5 and 6.

No. 2 attends the elevator.

No. 3 attends the muzzle.

Nos. 8, 10, 11, and 13, the shifting-spar, assisted by as many of the crew as can take hold.

No. 7 draws the loop-bolt.

The Stroke Oarsmen run the field carriage forward, the Quarter Gunner guiding it on the track by the trail.

2. Shift the Howitzer.

34. Nos. 1 and 2 clear the elevator; heave up the breech of the gun by the spar; Nos. 5 and 6 back the bed on the slide; run the field carriage a little forward, so that its lugs come under the loop of the howitzer; lower the piece; put in the loop-bolt and elevator; hook on the drag-rope and ship the trail-handspike in its socket.

4. Land.

35. Nos. 5, 6, 7, and 8 now jump out of the boat, and, with Nos. 3 and 4 divide to each skid; not standing between them, but keeping outside of them. The Stroke Oarsmen wheel the piece up to the gunwale by the spokes, the Quarter Gunner guiding the trail by the trail-handspike, so as to ease the howitzer down from the bow, the Quarter Gunner guiding it on the skids with care, so that the wheels may not run off sideways.

When down off the skids and on the bottom, the drag-rope may be hooked around the axle, and the howitzer run up on the beach.

The Captain of the howitzer superintends, and assists whenever it may be necessary.

The sponges and rammers are now to be attached in their places on the trail.

The transporting boxes will also be filled.

EMBARKATION OF THE HOWITZER.

36. When the howitzer is to be embarked, the transporting boxes should be taken off from it, and put in the boat separately.

The men unsling the ammunition-pouches or passing-boxes, and pass

Crew at their Stations for Action.

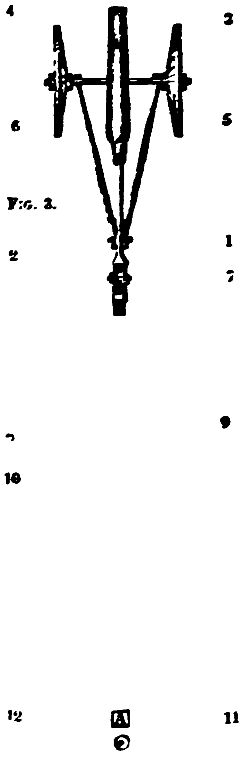


Fig. 3.

Crew at the Drag Rope.

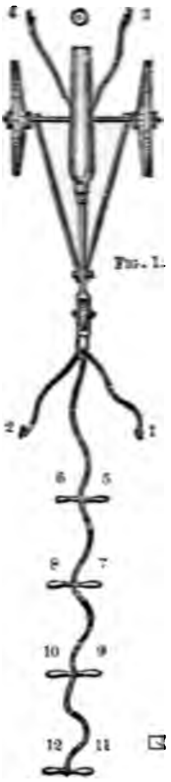
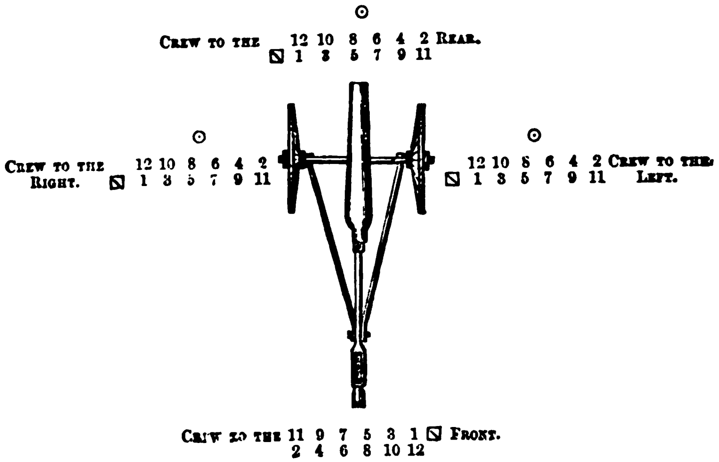


Fig. 1.

Fig. 2.



them into the boat, which is to be brought to a convenient distance from the beach, the skids laid and secured.

The field carriage is pointed with the trail towards the boat, and drawn down to the skids, with a wheel resting on each.

Nos. 3, 4, 5, 6, 7, and 8 divide at the wheels, and take hold of the spokes, so as to assist the carriage up. No. 14 ships the trail-handspike, and tends it with No. 15. The rest of the men get into the boat and take hold of the drag-rope. At the word HEAVE! the men at the wheels bear the carriage up on the skids, those in the boat haul on the drag-rope, and the two at the trail bear it up, so that the Quarter Gunner, who stands at the bow, can get hold of the trail-handspike and guide the carriage fairly.

When the howitzer is in the boat, the skids are unhooked and put in the boat by Nos. 3, 4, 5, and 6.

The howitzer may now be shifted to the boat carriage, by reversing the process already described in orders Nos. 1, 2, and 3, for the shifting to the field carriage.

37. EXERCISE WITH HOWITZER ON FIELD CARRIAGE.

GUN'S CREW.

Stations.	*Duty.*
Quarter Gunner.	Charge of ammunition and spare equipments.
No. 1. Captain rear of breech, to the right.	*Captain* of *piece*—points and fires the howitzer, superintends orders, and gives orders in absence of an officer.
2. Rear of breech, to the left.	Closes the vent, puts in primer.
3. Right side of muzzle.	Sponges and rams home.
4. Left side of muzzle.	Receives and enters ammunition.
5. Rear and outside of right wheel.	Assists at right wheel.
6. Rear and outside of left wheel.	Passes ammunition, assists at left wheel.
7. Five yards rear of right wheel.	Assists at right wheel, attends bolt of trail wheel, and trail handspike.
8. Five yards rear of left wheel.	Passes ammunition, assists at left wheel.
9. With No. 7.	Assists at right wheel.
10. With No. 8.	Assists at left wheel.

(Preparatory Order)—MAN THE HOWITZER.

38. The men go to their stations as above designated.

If the piece has been just landed, the *Captain of the howitzer* will have been provided with his haversack, previously supplied.

All the men, except Nos. 1 and 3, with one round in a pouch.

No. 3 takes the sponge and rammer.

No. 6 unbolts trail wheel, and ships handspike in its socket of trail.

The transporting boxes, if there be any with the howitzer, are to be deposited about twenty-five yards in the rear of the howitzer, in charge of Quarter Gunner.

The drag-rope is deposited with the ammunition-boxes.

1. SPONGE.

39. No. 3 enters the sponge, and, pressing it firmly to the bottom, turns it round and withdraws it. 2 serves the vent.

Quarter Gunner takes a round from the ammunition-box, or from the pouch or passing box of one of the men; and, if shell or shrapnel be used, holds it for the Officer in command to adjust the fuze.

2. LOAD.

40. The charge is to be passed along by the Quarter Gunner to No. 8, and by No. 8 to No. 6, and by No. 6 to No. 4, who enters it into the muzzle.

No. 3 rams home to the mark on rammer-handle.

No. 2 puts in primer, and covers it with his hand until Nos. 3 and 4 have withdrawn to their stations outside the wheels.

3. POINT.

41. Officer of gun puts up the sight, as directed by Officer in command.

The Captain of the gun gives the piece the proper elevation with the screw, and causes No. 9 to train the gun with the trail-handspike to the desired direction. He then withdraws as far as the lock laniard permits, standing on the quarter of the breech, and outside of the wheel.

No. 2 stands outside of the left wheel. Nos. 3 and 4 fall back, and the remainder of the gun's crew take the stations first assigned them.

4. FIRE.

42. The Captain of the howitzer instantly draws the laniard at the word.

No. 2 closes the vent.

Nos. 4, 6, and 8 go to the left wheel; 5, 7, and 9 to the right wheel, taking hold of the spokes, ready to wheel the carriage forward, as may be directed by the Officer in command.

(Concluding Order)—SECURE THE HOWITZER.

43. The Quarter Gunner secures the transporting boxes, and gets ready the lashing.

The Captain of the howitzer coils the laniard around the lock.

No. 7 bolts the trail wheel.

No. 3 may carry the sponge in his hand if the fire is merely suspended.

No. 7 may also carry the trail-handspike.

Nos. 8 and 9 hook on the drag-rope, and lead its parts fair for taking hold.

Wheel the piece to the ammunition-boxes, and place them on the axle.

The piece is now ready for any change of position.

(For the manœuvre of a "Battery of Howitzers," see "Naval Light Artillery Afloat and Ashore," used at the Naval Academy.)

NOTES ON THE USE OF BOAT HOWITZERS.

44. N. B.—Before equipping boats with the howitzers, notice attentively the "hints for general service," commencing at page 146, "Boat Armament of the U. S. Navy," and "suggestions for landing," page 127, of that system, which relate more especially to the condition and management of boat guns.

45. "Too much care cannot be taken to be fully provided, and to have each detail in good condition; for, after the boat has left the ship, it may be impossible to compensate for failure in some seemingly trivial article."

46. The chief purposes of naval light artillery are:

1. To attack small vessels that are lightly armed and furnish but slight protection to the crews.
2. To contend with other armed boats.
3. To cover the landing of regular troops.

47. The landing of seamen is rather a remote contingency in the naval service, and should never be resorted to when opposed by good infantry, or when the object to be attained would take the seamen too far from their boats, which should be the base of operations.

48. *Boat Guns.—No tackles* are required to run out 12-pdrs.; 24-pdrs. may possibly require them.

49. The hole in the cascabel for recving a breeching has been purposely omitted in howitzers recently cast, as hitherto the use of a breeching has not been found necessary. Should one be required a thimble may be fitted to the neck of the knob to serve in place of this hole.

With a breeching the piece may be fired as if on an ordinary carriage.

50. The recoil is controlled by compressing the slide between the bed and the lower plate. It is necessary, however, that the surfaces of the carriage to be in contact should be plane. If they are not so, dismount the gun and examine them, and where the wood is worn smooth remove it in the slightest manner and correct the surfaces generally, which will be found to reduce the recoil. In making the surface plane it is by no means necessary that it should be rendered smooth. It ought to be as little so as possible for the present purpose.

51. *Field Carriage.*—In order to moderate the recoil on smooth ground, take out the axle or pin of the trail wheel and turn the wheel up on the trail.

In using the howitzer on shore two transporting boxes are supplied, placed on a support and lashed to the axle of the field carriage. When more than a single piece is landed it may be found convenient to secure the trail of one field carriage to the axle of another, and then, by means of pieces of stuff, or boat's spars, secured from axle to axle, to place the ammunition boxes, provisions, pouches, &c., upon them.

52. *Shrapnel* may be effectively used where the dispersion of common canister becomes too great and its effects feeble. It takes the place of common shell, to a great extent, when uncovered masses of men are in view, and is designed to burst in front of troops, and at just such a distance and height as to disperse the balls among them.

53. Similar terms are used in marking the sight and the fuze. Thus, if the fuze be adjusted to 2″, and the piece elevated by the sight raised to the line on it marked 2″, then the shrapnel will burst about 500 yards from the piece and spread its balls from that point to a considerable distance further—effectively at least 150 yards.

The adjustment of the fuze to the distance and the altitude of explosion are regulated to the elevation; and, therefore, the three conditions to good effect may be said to depend mainly on a correct knowledge of distance.

54. The 12-pdr. shrapnel contains 80 musket balls, and if its explosion occur at one hundred or one hundred and twenty yards in front of and fifteen to twenty yards above the object, one-seventh of the number of balls may be relied on to take effect on an object 20 by 10 feet square.

55. The shell may be advantageously substituted for shrapnel when the hostile force is sheltered, especially by such quarters as small craft or merchantmen afford, or when material of any kind is the object of the fire.

56. At a couple of hundred yards canister, only, is required.

57. When provided with the Bormann fuze the shrapnel, or shell, as issued, is complete. The upper surface of this fuze is graduated into seconds and fourths of seconds; and it is only necessary to lay bare the composition contained in the fuze, by the cutting tool, to prepare the projectile for instant use. In this respect the Bormann fuze has an advantage over the ordinary fuze. The length of the fuzes limits the distance within which the fire of these guns is considered as effective.

58. The introduction of the 12-pounder rifled howitzer has greatly extended the accuracy and effective range of the boat and field artillery.

Solid shot and shell have sufficient penetration to be effective against ordinary wooden vessels at any distance which the elevation allowed by the respective carriages will reach.—(See Table of Ranges)

The shrapnel has sufficient velocity at 2,000 yards to disable men and horses.

Hitherto no certain or efficient time fuze has been adopted for rifled guns.

There are objections to firing grape and canister from rifled guns, as the grooves are injured thereby, and the rotary and irregular motion given to the mass diminishes its effect. If used the balls should be of lead.

59. Fixed ammunition is preferable on the score of greater convenience and of avoiding difficulties.

60. Moistening the sponge is recommended. Brightening howitzers is prohibited.

MANŒUVRES OF BOATS ARMED FOR SERVICE.

61. The boats of a vessel being completely armed and equipped, as directed, they are to hoist their colors, shove off, and fall in as follows:

No. 1. First Launch.
No. 2. Second "
No. 3. First Cutter.
No. 4. Second "
No. 5. Third "
No. 6. Fourth "

Or, if they be less than six in number, they are to fall in agreeably to the order of their size and designation, with the Senior Officer always in the leading boat.

The boats of each ship are to constitute a subdivision.

62. When the Officer designated to command all the boats of a squadron has had them assembled, they are to form, in the above order, into as many columns as there are vessels to which the boats belong.

ORDER OF COLUMNS.

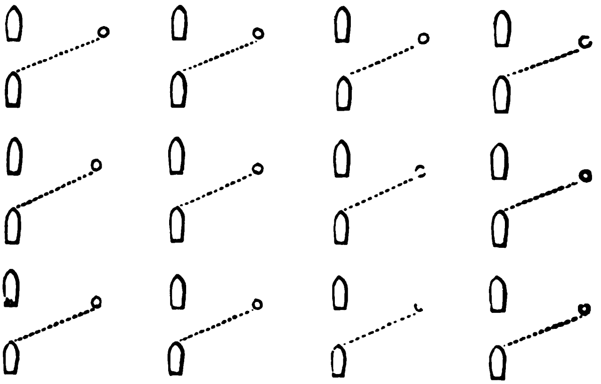
63. The order of seniority of the Commanding Officers of subdivisions of boats is to regulate the relative position of the columns; and, supposing that the natural series of the alphabets represents this order of seniority, the columns will be as follows:

D	B	H	F	A	G	I	C	E
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6

This arrangement of boats is to be called the first order, and it is to serve as a basis for all other manœuvring.

TO FORM IN THE ORDER OF ATTACK THREE DEEP.

64. Each even numbered boat of a column is to be placed to the right of the next ahead of it.

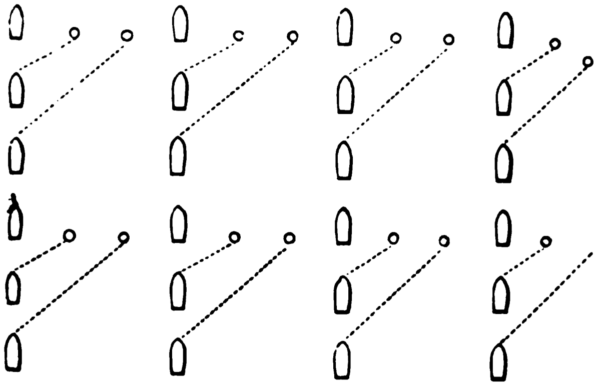


Thus, in the order of attack, three deep, the boats will be arranged as follows:

D	2	B	2	H	2	F	2	A	2	G	2	I	2	C	2	E	2
3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4
5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6	5	6

TO FORM IN THE ORDER OF ATTACK TWO DEEP.

65. In each column boats Nos. 2 and 3 are to be placed to the right of No. 1, and boats Nos. 5 and 6 to the right of No. 4.



Thus, in the order of attack, two deep, the boats will be arranged as follows:

D	2	3	B	2	3	H	2	3	F	2	3	A	2	3	G	2	3	I	2	3	C	2	3	E	2	3
4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6

TO FORM IN THE FIRST ORDER.

66. To pass from either order of attack just mentioned, to the First Order, the manœuvring is to be the inverse of that by which the order of attack is formed.

TO FORM LINE AHEAD.

67. The orders of attack being formed as designated, it is sufficient for all the boats together to alter the course eight points, one way or the other, to become arranged in a line ahead, in two or three columns.

Being thus arranged in a line ahead, by returning back 8 points, the boats will be again arranged in an order of attack, two or three deep.

TO CHANGE THE DIRECTION OF THE FRONT.

68. The evolution of changing the direction of the front of the orders of attack is effected by a general movement at the time the course, which the leaders of columns are to steer, is shown by signal.

TO FORM THE ORDER OF RETREAT.

69. This order is the reverse of the first order.

To pass from the first order to the order of retreat all the boats turn together 16 points in the same way, and thus retire protected by the guns of the launches.

FORMATION OF DIVISIONS.

70. Two or three divisions of attack may be formed to operate upon two or three points at the same time.

In the first case, the boats on the right, including those of the Commanding Officer, constitute the 1st division, and those on the left the 2d.

In the second case, the third of the boats on the left constitute the 2d division; the third on the right the 3d division; and the third at the centre the first division.

NOTE.—The manœuvres of boats armed for service, from article 61 to 70, inclusive, are derived from the "Réglement sur le service Intérieur a bord des batiments de la flotte," published by authority of the French government in 1852.

LANDING SEAMEN, MARINES, AND HOWITZERS FOR EXERCISE OR SERVICE ON SHORE.

71. As the efficiency of seamen when landed in any considerable number depends most materially upon a proper system of organization and training previous to their being landed, and without which they are inefficient, the following system is recommended:

72. The small-arm men are to be formed into companies of 80 men, with 4 petty officers. Each company to be commanded by a Lieutenant, with two other officers. The company to be sub-divided into two platoons, and each platoon into two sections, and to be exercised in such movements as are absolutely necessary to manœuvre as a company and in battalion, by the officers who are to command them.

73. Small vessels should furnish a platoon of 40 or section of 20 men, that the companies formed by their aggregation may be of equal strength.

74. The companies when landed are to fall in, and number from the right according to the seniority of the Captains of their respective ships, so that they at once will fall into their places according to their number when landed.

75. Each ship landing two companies is to be prepared to land with the small-arm men six Pioneers—2 with a saw and axe each, 2 with a pickaxe and spade each, 2 with a small crowbar and sledge-hammer, or such entrenching or other tools as the nature of the expedition may require; the tools to be slung on the men's backs; smaller detachments a proportionate number.

76. The ship's bugler, if she have one, or drummer will be sent with the men. He is to be able to sound the "Assembly," "Retreat," "Close," "Extend," "Commence Firing," and "Cease Firing," which sounds the men are to be accustomed to on board.

77. If the men are likely to be on shore during the night they should have a haversack and blanket slung across their shoulders.

78. As muskets are apt to miss fire the first time if not properly clean, the greatest precaution is to be taken to see that the nipple is perfectly clear before loading; first, by blowing down the barrel and placing the finger before the nipple, to feel that the air passes through it, and afterwards snapping a cap off to dry up any oil or moisture that may be in the

barrel. To avoid accidents it is better not to cap the muskets until after landing.

79. When field pieces are landed, the guns shall be numbered from the right in the same manner as a company.

80. One or more armorers should be sent with each landing party with cleaning-rods, screw-drivers, spare nipples, &c.

81. The boats should be formed in divisions, according to the seniority of the Captains of their respective ships (or of the Commanding Officers of the divisions,) numbering from the right. The seamen and marines, having been told off in companies previous to leaving their ships, on landing they will form immediately in the same order.

82. The howitzers being mounted as boat's guns and prepared for landing, are brought at once into action or remain in the boats according to circumstances.

83. Each division of boats should have a distinguishing flag; and scaling ladders, entrenching tools, &c., should be carried by designated boats.

84. The boats will always land a boat's length apart. Before leaving the ship four boat-keepers should be appointed to each boat carrying a howitzer, and two for the others, with an officer in charge of each division of boats, who are on no account to leave them. Should there be a probability of the landing party being attacked on a re-embarkation, the boats should be hauled off to their anchors, with a long scope of cable, having a stern line to the beach, and a man in the boat to veer in, that the troops may be readily embarked. The officer left in charge of the boats should be careful to avoid being surprised; and, if circumstances admit, strengthen his position by cutting down trees and throwing up small breastworks a short distance in front.

85. A fast pulling boat with Medical Officers will attend in rear of the line, designated by a yellow flag.

86. Should the distance from the point of landing be considerable, the boats of each division, in tow of each other, lightest boats leading, will fall in—the leading boat of each division abreast, (Art. 63,) leaving space for the whole line to form abreast when ordered. On approaching the beach the tow-ropes should be cast off, and the launches with howitzers dress up in line ready to open fire, if necessary, to clear the landing. The officer

in command will commence firing from the howitzers when he thinks fit; but no musketry is to be fired without special orders.

87. When the Commanding Officer perceives the beach to be clear, (or when he considers it proper,) he will order "Cease firing," and direct the boats with skirmishers and light howitzers to pull in and land as quickly as possible. On landing they will immediately extend, advance, and seize the first cover near the beach, if there be any, but will not open fire till the officer commanding them sounds "Commence firing." The main body then pull steadily in and land, forming line in rear of the covering party. The howitzers form on the flanks of their divisions, or as ordered. Pioneers and scaling ladders as ordered. The main body being formed will advance in line or column according to circumstances, preceded by the skirmishers firing, if necessary. When firing in close order the front rank should fire kneeling, as, owing to the shortness of muskets, accidents frequently occur. Under certain circumstances, as advancing on an open beach, the boats might be employed on the flanks to cover the advance or retreat.

88. Should the boats be employed for the disembarkation of troops, the same arrangement should be made. It will then be desirable that every boat should carry a flag similar to that of the Commanding Officer of its division; and, when in large numbers, the boats should also be painted according to the colors of the flags, that the troops may readily know their own boats.

89. The re-embarkation should be conducted on similar principles to the disembarkation—the skirmishers and light howitzers extending in rear of the line, which will then pass through the intervals, forming again, if necessary, to support the skirmishers, who will retire firing, and re-form in rear of the line. The main body will then embark, followed by the covering party under cover of the boats' guns.

PART III.

ORDNANCE AND ORDNANCE STORES.

PART III.

CHAPTER I.

ORDNANCE AND ORDNANCE STORES.

1. All articles of Ordnance and Ordnance Stores, when duly delivered at any navy yard, are to be borne on the books of the Inspector of Ordnance, and duly accounted for, according to such regulations as may, from time to time, be established by proper authority.

2. He will make monthly estimates and requisitions for all materials and articles which may be required by the master workmen in the Ordnance Department, and which he may deem necessary; which requisitions are to be forwarded to the Chief of the Bureau for his approval.

No articles are to be purchased without previous requisitions, nor any to be used until duly inspected, approved, and receipted for.

Before reception every article shall be carefully examined by the master workman in whose department it is required and such other person as the Inspector shall appoint, and compared with samples, to see that they conform to the standard, and in quantity and quality as called for by the requisition or order of the Bureau for their delivery.

3. The Inspectors of Ordnance at all navy yards shall have the immediate custody of all articles appertaining to ordnance, and they shall be kept in suitable places, separate from the other articles in the yard.

4. Inspectors of Ordnance having charge of the articles above mentioned are, under the direction of the Commandant of the Yard, to be responsible for their being carefully attended to, and, as far as possible, preserved from injury.

5. Whenever any of them shall require repairs, other than those which can be made in the ordnance workshops, the Inspector will apply to the Commandant of the Yard, or to the Bureau through him, for the necessary means to keep all articles in his charge in order and ready for service.

6. He shall require from master workmen employed on ordnance work reports in the required form, (see blank forms,) of the expenditure of materials and labor upon each and every object under their immediate superintendence, at which time they will make a return of all unexpended material on hand. They will also be responsible for all waste and improper use of material by those under their general superintendence.

7. The Inspector of Ordnance shall have authority over all master and other workmen employed on ordnance work, and direct all its details.

He will examine and certify to the correctness of all bills rendered for materials, supplies, or labor in the Ordnance Department, and examine and certify to the correctness of the pay-roll of all persons employed on ordnance work.

8. No Inspecting Officer or person employed by the Bureau is to show to or leave in the way of persons not authorized by the Bureau any drawing, descriptions, or dimensions of guns under contract, nor to facilitate the examination by such persons of the guns themselves.

9. The resident and other Inspectors are to inform the contractors of this strict requirement on the part of the Bureau, and to request them to cause it to be rigidly enforced by all persons under their control.

10. It is most positively forbidden to communicate any information *whatever* in relation to ordnance matters, or to show or describe ordnance work, of any description, *to any person not in the employ of the government*, unless by superior authority.

11. The Inspectors of Ordnance at the several yards and stations are required to enjoin upon *all their employés* the strictest secrecy in relation to everything connected with their duties. No information whatever is to be given to any one in relation to the prices of articles, the details of work, or the condition of ordnance or ordnance supplies.

Any breach of this order is to be followed by prompt dismissal from employment.

12. Whenever any ordnance stores shall be furnished to vessels, or for any other purpose, the Ordnance Officer shall take proper receipts for them from the officer to whom they are delivered. These receipts shall be signed at the Ordnance office, and the commander is required to ascertain before sailing if the proper officers have signed all receipts and vouchers.

13. The Ordnance Officer will deliver with them an invoice of the number and cost of such stores, retaining a receipted duplicate approved by the commander to be forwarded to the Bureau of Ordnance.

14. A separate list shall be furnished to all commanders of vessels of the ammunition furnished, which list is to be returned to the Ordnance Officer of the yard to which the vessel shall return, with any additional supplies which she may receive during the cruise entered on it.

15. The allowances which are prescribed for the different classes of vessels in the table of allowances are not to be exceeded, except by the express sanction of the chief of the Bureau of Ordnance.

16. It shall be the duty of any commander of a vessel, before making

or approving requisitions, to examine the allowance table and see that the articles required are allowed. If these articles are not allowed, or are in excess of the allowance, but are, in his opinion, necessary for the use of the ship under his command, he will state opposite the article "in excess of allowance," or "not allowed," and the reason therefor, before sending it to the Commandant of the Yard or squadron for his approval.

17. All ships' stores, except the ammunition, shall be delivered to the Gunner, or other officer appointed to receive them, at the ordnance stores, the Inspector of Ordnance furnishing him with the means of transportation and men for stowing them in their appointed places on board, when the crew are not available for this purpose.

18. All stores landed from ships will be received at the ordnance store, when all responsibility on the part of the officer delivering them shall cease, and a survey be held, as soon thereafter as practicable, to determine the quantity of stores and the condition in which they are delivered.—(See form of survey.)

19. It having been found that in the "Reports of Survey" made at the different Navy Yards on the Ordnance Stores of vessels returning from sea many articles are put down as "deficient by Returns" without these deficiencies being in any way accounted for, the Bureau directs that the Surveying Officers shall require the Gunner (or other officer having charge of the Ordnance Stores, in case there be no Gunner on board) to show a just cause for said deficiencies; a statement of which, properly signed, is to be forwarded to the Bureau with the Report of Survey. In case of his failure to do so, he will be held responsible for the loss, and the value of the deficient articles checked against his pay.

Where arms or other articles are lost or destroyed in action, the fact must be properly authenticated by the signature of the Commanding or Executive Officer.

20. Ordnance Ledgers of all vessels coming from a cruise shall be signed by the Gunner or Executive Officer and the officer in command before leaving the yard or station.

Receipts must invariably be taken of all ordnance, ordnance stores, equipments, and small arms, when transferred from the keeping of one officer to another.

And whenever *any* article of ordnance is lost or mutilated, the value of the same will be deducted from the pay of the person having it in his possession at the time, unless sufficient reason for a contrary course should appear.

21. It shall be the duty of the Inspector of Ordnance (or of the officers

who inspect a ship on her return from a cruise) to report to the Bureau the condition in which the articles under the charge of the Gunner may be transferred, that his care and attention may be properly known and appreciated.

22. Officers upon Ordnance duty at Navy Yards may correspond with the Bureau on subjects connected with Ordnance duties, forwarding their communications, open, to the Commandant of the Yard for transmission.

23. The dates of all circulars, orders, telegrams, or letters to which reference is made in corresponding with the Bureau, *shall be distinctly quoted.*

And the same rule is to be observed in forwarding triplicate Bills, Bills of Lading, and Invoices, the date of the order or orders being written across the face in red ink.

24 The Commandants will, in forwarding such communications, accompany them with such remarks or recommendations as they may deem proper, and at any other time make such suggestions as they may consider will promote the public interest.

INSPECTION AND PROOF OF NAVAL GUNS.

25. All cannon for the navy, cast at private foundries, will be in strict accordance with the terms of the contract made with the Bureau of Ordnance, and subject to the inspection of an officer detailed to supervise the operations.

26. Each foundry, and the Inspector, if there be one stationed at it, shall keep an accurate record in the prescribed form of the character, mixture, and mode of working the metal of each gun.

27. A proper proving ground and facilities for proving cannon shall be provided by the founder, and the guns placed thereon at his expense.

28. Guns offered for inspection shall be scraped and cleaned, if rusted, and their foundry numbers noted. They shall then be examined carefully, inside and out, for defects of metal or manufacture.

29. They must not be covered with paint, lacker, oil, or any other material. If it is ascertained that any attempt has been made to conceal defects the gun is to be rejected without further examination.

30. Before proceeding to verify the dimensions of the gun the Inspector will assure himself that such instruments as gauges, profiles, measuring rods, &c., are accurately set or marked according to the dimensions given

in the tables or draughts furnished by the Bureau of Ordnance, and will see that the necessary corrections are made by the standard rule.

31. The interior of the bore is to be examined by reflecting the rays of the sun into it from a mirror, or, if the sun is obscured, by the reflector and spirit lamp.

32. The cylinder gauge is then introduced, which must pass to the bottom of the cylindrical part of the bore, or the bore is too small. The exact diameters of the bore, and of the cylindrical part of the chambers of chambered guns, are measured with the star gauge at intervals of ½ inch in the part of the bore occupied by the shot, of 1 inch in the rest of the bore behind the trunnions, and of about 1 calibre from the trunnions to the muzzle.

33. To verify the position of the axis of the trunnions, set the trunnion square on them, and see that the lower edges of its branches touch them throughout their whole length; push the slide down till it touches the surface of the piece opposite the axis of the trunnions, and secure it in that position by the thumb screw; turn the gun over and apply the trunnion square to the opposite side at the same distance from the base, and if when the point of the slide touches the surface of the piece the lower edges of the branch rest on the trunnions the axis of the trunnion rest in the same plane with the axis of the bore, if they do not touch the trunnions their axis is above the axis of the piece by half the space between; and if the edges touch the trunnions, and the point of the slide does not touch the surface of the piece, their axis is below the axis of the piece. *The natural line of sight*, when the axis of the gun is horizontal, should be distinctly traced upon the base ring, lock piece, sight masses, and swell of the muzzle before leaving the mill. This line serves as a guide to the placing of the sights, and also to verify the position of the exterior orifice of the vent. This line should be in the same vertical plane with the axis of the bore, and the Inspector will satisfy himself of this coincidence, either by examining the lathe and mode of centering or by actual measurement. This line will be at right angles with the transverse piece of the trunnion square, if the axis of the trunnions be at right angles with the axis of the bore, which must be verified by measuring the distance of each trunnion from the base ring with the *trunnion rule*. If the alignment of the trunnions be accurate the edges of the *trunnion square* will fit on them when applied to different parts of their surfaces. Their diameters and cylindrical form, and the diameter of the rim bases, are determined by the *trunnion gauge*.

34. To measure the length of the bore push the *measuring rod* to the bottom of the bore, apply a straight-edge to the face of the muzzle, and read the length of the bore off on the rod.

35. The exterior lengths of the gun are measured by the *profile board* marked with the true dimensions.

36. The exterior diameters are measured with the *callipers and square*, or by the *set gauges* used in turning.

37. The interior position of the vent is found by a mark made by the vent gauge on the *rammer head* or *profile board* held firmly against the bottom of the bore; two impressions should be taken. The position of the exterior orifice is also verified.

38. The inclination of the vent with the axis of the bore is found by the *semicircular protractor* and *vent gauge.*

39. The vent is examined by the *vent gauge* and *searcher.*

40. The dimensions of lock pieces and sight masses, the opening of the mouth of the cascabel, and the diameter of the jaws are verified by the *cascabel blocks.*

41. The following variations from the true dimensions may be tolerated by the Inspector:

			Inches.
In the diameter of the bore		more	0.03
		less	0.00
Exterior diameters	where turned or planed	more	.05
		less	.05
	where not turned or planed	more	.20
		less	.05
In the length	of the bore, more or less		.10
	from rear of base ring to face of the muzzle, more or less		.25
	of the cascabel, from rear of the base ring to the end, more or less		.20
	of the reinforce, more or less		.15
From the rear of trunnions to the rear of base ring or line, more or less			.10
In the length of chamber, more or less			.10
In the position of the axis of the trunnions	above axis of the bore		.00
	below axis of the bore		.20
In the length of trunnions, more or less			.05
Diameter of trunnions, less			.05

In the same gun no variations to be tolerated in the position of the trunnions, or in their alignment.

In the vent	diameter, more	0.025
	diameter, less	.000
In lock piece any dimensions—more .1, less		.00
Variation of position of exterior orifice of vent		.05
Idem of interior orifice of vent		.20
Depth of cavities	in the bore or vent	.00
	on exterior surface of reinforces	.00
	elsewhere	.25
	On trunnions, within one inch of rimbases	.10
	On trunnions, elsewhere	.25
Enlargement of indentation of bore by proof not to exceed		.02

42. The measures are to be taken by scales corresponding with the standard measures of the United States.

43. If two or more cavities should be near each other on the exterior, the gun may be rejected, though the cavities should be of less depth than the allowance in the table.

44. Gunpowder used for the proof of cannon shall be of the best quality service cannon powder of not less than 1,500 feet initial velocity from the 6-pounder gun pendulum, with a charge of ¼ the weight of shot of mean weight and windage.

45. The shot used in the proof of cannon must be of full weight, and not less than the mean, nor above the high gauge.

46. After the powder proof, the searcher is to be introduced, pushed slowly in and out, turning it in the bore at the same time, and thus all parts of the bore are to be thoroughly examined.

47. If one of the points hang, its position is marked on the outside, and the place scrutinized by sounding with a single prong, and taking the impression of the defect in wax.

48. The guns are then to be washed and remeasured at the same points as before proof, and the diameters recorded.

WATER PROOF.

49. The pressure to be applied in the water proof will be two atmospheres, or thirty pounds to the square inch.

50. The penetration of water in this proof through the metal of the piece, in any place, will cause the rejection of the gun, and if on examination

after the water proof, there shall be any defects indicated by weeping or dampness in the bore, the gun shall be rejected.

51. The water proof is alone to be depended on to detect minute clusters of cavities in the bore, which, for this purpose, should be perfectly dry and examined by sunlight. All inspections, consequently, should take place in fair weather, and when the temperature is above the freezing point.

MARKING GUNS.

52. After proof, guns shall be marked with the register number, the initials of the name of the foundry, and the weight in pounds, on the base ring or line; with the calibre and date on the right trunnion; and with the letter P and Inspector's initials on the left trunnion. The stamps used in marking shall be one inch in height. On the upper jaw of the cascatel, the preponderance in pounds, to be lightly stamped with half-inch figures. On the end of the upper jaw, ang the cascatel block, the foundry number, in quarter-inch figures.

53. Cannon rejected for imperfections not deemed of a dangerous character, or which receive them accidentally in the course of proof, will be marked thus ⊕C, near the foundry initial. If rejected for defects of metal they will also be marked X. M.; if for dimensions only, which cannot be remedied, X. D.; if from water proof, X. W.; and if from powder proof, X. P. Such as are rejected for defects of a dangerous character, or which receive them accidentally, will have one trunnion broken off.

54. The results of the measurements and examinations are to be noted in the inspection report against the number of the gun.

55. After proof, a coat of fish oil is to be given to the guns which pass inspection, to protect them from rust until they are delivered at the Navy Yard. In this operation the Inspector will be careful to have the bores and the interior of the vents perfectly covered with oil.

56. DESCRIPTIVE LIST OF INSTRUMENTS REQUIRED AND USED IN THE INSPECTION AND PROOF OF GUNS.

1st. *A mirror* for reflecting the sun's rays into the bores. Two will be required if the gun be in rear of the Inspector.

2d. *A lamp*, attached to a staff, for examining the bores when the sun is obscured or the guns are under cover.

3d. *A cylinder gauge.* This is a hollow cylinder of iron, turned to the least allowed diameter of the bore, and one calibre in length. It has a cross-head at each end, one of which has a smooth hole through its axis to fit the staff, and the other is tapped to receive the screw in the end of it.

4th. A measuring staff, of steel or iron, in joints of suitable length, which are connected together by screws. Each joint is provided with a light brass *disc*, the diameter of which is 0.05 inch less than that of the bore. Through the centre of the disc there is a hole, which fits upon a shoulder at the joint; the whole is so arranged that when the joints are screwed together, the discs between them are held firmly in place, while the length of the staff is not affected by them. A *steel point* is screwed on to the end. When pushed to the bottom of the bore, the staff coincides very nearly with its axis. The outer joint is graduated to inches and tenths. A *slide* is made to play upon it with a vernier scale, graduated to hundredths of an inch. On the inner end of the slide a branch projects at a right angle sufficiently long to reach across the muzzle face, and when in contact with it, to indicate the precise length obtained from that point to the end of the measuring points on the other end of the staff. A half disc of wood made to fit the bore, with a groove for the staff to rest in, placed just inside of the muzzle, is useful in preventing any springing of the staff.

The point being taken off, the staff can be used with the cylinder gauge to measure the distance to which the latter descends. But, as the graduation is intended for the points, care must be taken in this case to allow for the difference.

5th. *A chamber gauge* for verifying the shape and size of conical chambers.

The head should be made of close-grained, well seasoned wood, and of the exact dimensions of the chamber. Two planes, crossing each other at a right angle, coinciding with the vertical and horizontal central sections, have been found better than a solid block. The edges should be beveled. A metal socket in its centre connects it with the measuring staff. Being pushed to the bottom of the bore, if the length coincides with that obtained by the point, it is obvious that the chamber is large enough, provided the cylindrical part has not been bored too deep, in which case a shoulder would be found at the junction. The edges of the gauge should be chalked before it is inserted. When withdrawn, if the chalk-marks are visible all around the chamber, it is evident that the chamber is not too large. With slight modifications, this arrangement may be applied to the slope of cylindrical chambers, and to the curve at the bottom of the bore of any guns. Should the inspection of guns with conical chambers or slopes take place at the foundry, an examination of the chamber reamer will be very satisfactory. If found correct in size and shape, the impossibility of making the chamber *too large* will be apparent.

6th. *A star gauge* for measuring the diameters of the bores and of cylindrical chambers. This instrument is composed of *the staff, the handle,* and a *set of points* for each calibre.

The staff is a brass tube, made in three pieces for convenience of stowage, and connected together, when required, by screws. Its inner end expands into a head, in which are placed four steel sockets, at equal distances from each other, which receive the points. Two of the sockets opposite to each other are secured permanently. The two others are moveable. A tapering plate or wedge, the sides of which are cylindrical, runs through a slit in the head; an aperture in the inner ends of the moveable socket embraces the cylinder, so that when the plate is moved forward or backward the sockets are projected or withdrawn. The tapering of the plate has a certain known proportion to its length, so that if it is moved in either direction a given distance, a proportional movement is imparted to the sockets, and to the points which they contain. It is easy to see how, in this manner, a movement of .10 inch may increase or diminish the distance between the points .01 inch. Therefore, there would be no difficulty in estimating, to a considerable degree of accuracy, a difference of .001 inch between the points. In general, however, the distance on the plate required to move the points .01 inch is about .06 inch only.

A square sliding rod is connected with the tapering plate, and runs through the whole length of the tube, projecting some inches beyond the outer end. This rod has as many parts as there are joints in the staff, and like them connects by screws. Each section of the rod works in its proper joint, through a square socket at each end, and is prevented from falling out by pins. When screwing the joints together, if the ends of the rod are pressed up to each other they become connected by the same motion.

The staff is graduated to inches and quarters, so that the distance of the points from the muzzle of the gun may always be known. A centre line, starting from the centre of the upper socket, is marked upon the staff throughout its length.

The handle in use at present is of brass, made to fit over the outer end of the staff, and to connect with the sliding rod by a screw having a large milled head at the outer extremity of the handle. It may be used on either joint as required. A slit through the handle permits a part of the staff near the end to be seen beneath. A scale on one side of the slit is graduated with the distance that the rod moves to throw the points .01 inch apart.

That part of the handle containing the slit and scale is separated from the other part; it is made to fit closely over it. On each side there is a small tube, a thread is cut in one, through which a fine screw, held by a stud on the permanent part of the handle, works and gives it motion; a guide runs through the other. Seen through the slit is a small plate of silver inserted in the staff, and a fine mark upon it to show the place of zero, when the points are adjusted. The zero mark on the scale is made to correspond with it by means of the screw just mentioned.

The points are of steel, with a strong shoulder at one end, below which the screw is cut that fits into the socket in the head. A wrench is made to fit the other end so as to turn the point firmly into its place. They are made of such a length that they will just pass into the adjusting ring when they are all in place. To this instrument belong the adjusting *rings* and the *muzzle rest* in the form of T.

Of the rings, there is one for each calibre, reamed out to the exact minimum diameter of the bore. The latter can be used for any class of guns. Its office is to keep the staff of the star gauge in the axis of the bore. For this purpose it contains a groove, above the perpendicular branch, to receive the lower half of the staff. There is a moveable slide on each branch which can be adjusted to marks for each calibre, so that points projecting from their rear will enter the muzzle and hold the rest in place. In this position the upper edge of the transverse branch coincides with the diameter of the bore.

A hook is pivoted on the inner side of the transverse branch on one side of the groove, and so fitted that when the star gauge is in the gun it embraces one-half of that portion of the staff which is above the groove. Therefore, if the transverse branch be placed so as to coincide with the axis of the trunnions, the hook thrown over the staff, and the latter turned so that the centre line just meets the end of the hook, the perpendicular points will be perpendicular to the axis of the trunnions. If the staff is then drawn out carefully, the measurements will all be taken in the same plane. A notch in the end of the hook, made to coincide with the plane of the muzzle, may be used for marking the distances on the staff.

The upright branch is moveable, and is made to fit into the end of the transverse branch for convenience and security in packing.

In examining the bores after proof, it has been found that the greatest indentation occurs, in general, near the seat of the projectiles; but as it is not always found at precisely the same point of the circle of the bore, a convenient mode of searching for it is desirable. This is supplied by a *disc for circular measurements*, which may also be considered as belonging to the star gauge. It is made of composition, and is divided into halves, with a hole through the centre to receive the staff of the star gauge. It is turned so as to fit into the muzzle of the gun, closely, with a projecting lip two or three inches broad, to hold it in place, and with cleats overlapping the edges, to keep it from going in too far. The face is a plane surface. The circumference is divided into as many equal parts as may be thought desirable, which are numbered in regular order. The centre hole is reinforced on the inside by a projection which is turned to receive a collar that fits closely around it and holds the two halves together, when they are placed on the staff. When ready for use, the face is in the plane of the muzzle face. Its zero mark is made to coincide with a light punch mark on the muzzle face, directly below the line of sight.

On the staff of the star gauge a *brass slide* is fitted, having a thumb screw to hold it in any position; from the inner end a point extends at a right angle to its axis, of sufficient length to meet the points at the circumference of the disc; a centre line extends from the base to the apex. The slide being moved so as to make its inner end coincide with any mark upon the staff at which a circular measurement is required, and the centre line of the point being made to coincide with that of the staff, it is secured by the thumb screw. The point of the slide is then in the same plane with the perpendicular measuring points, and its direction always indicates theirs—a series of measurements made before proof may thus be compared with another made at the same points after proof. It is obvious that the determinations will not be absolutely accurate, for when the gun is worn, should the stationary points be perpendicular, the moveable points being then horizontal would fall below the true horizontal diameter, and the measurement would be more in error than it would be with the points in any other direction. Still, if care is taken to preserve the points at the greatest length possible, a very tolerable degree of accuracy may be attained. Care must also be taken not to allow the joints of the staff to become so loose that the coincidence of the centre line is destroyed when they are screwed together. If this should occur, however, a few turns of thread placed between them at the time of putting the instruments together, would remedy the difficulty.

7th. *An instrument* for verifying the interior position of vents.

When the vent is drilled in the vertical plane of the axis, as in the guns of old patterns, a simple head, shaped to fit the bottom of the bore, or the chamber, with a staff fitted to it, is sufficient. But for the Dahlgren guns with two vents, some other plan is better. The following has been found more satisfactory: *A head,* of well seasoned wood, which is fitted to the chamber, is attached to a wooden disc of the diameter of the main bore. The surface of the head corresponds with a longitudinal, central section of the chamber. At the point where the projection of the vent would meet it a piece of hard wood is inserted. A central line drawn through its length, crossed at a right angle by another line at any known point from the smaller end, will afford convenient points to measure from. A stout, square wooden staff is attached to the axis of the head, at a distance equal to the length of the bore; the end is jogged into the centre of a *half disc* of wood which is fitted to the bore. The whole is so constructed that the straight edge of the half disc (or the chord) is in the same plane as a horizontal section of the head. A few holes are bored through the disc attached to the half head to allow the instruments to pass freely into the gun and out of it.

A wire, of untempered steel, of the size of the vent, with a sharp, well centred point, and a small *spirit level*, are required to use with this instrument. The gun being leveled, and the instrument being pushed to the bottom of the bore, the upper edge of the half disc, near the outer end of the staff, is then brought to a level. The surface of the half head then corresponds with the horizontal central section of the chamber. The point of the wire being pushed gently to meet it, will show very accurately the interior position of the vent.

8th. *Profile boards* for distances in front and rear of the base line.

Their lower edges are adapted to the shape of the gun, and the upper ones are parallel to the axis of the bore.

The distances from the base of the several parts, and of the points at which diameters are to be measured, are laid off accurately on the upper edge, and then marked in lines perpendicular to it on the sides and lower edges of the profile. An iron strip is attached to the upper edge to prevent warping, and the whole is well coated with *shellac varnish* to keep it from absorbing moisture.

The following instruments are used in connexion with the profile boards:

A rule for verifying the marks, of such a length that not more than one fleeting may be necessary; to be graduated decimally according to the standard.

A small square, of steel, to be used in referring the marks on the board to those on the rule.

A steel straight-edge, long enough to extend across the muzzle face and several inches on the board, to ascertain the extreme length from base to muzzle. It is also used for the same purpose at the extreme end of the cascabel. A steel scratcher to mark the gun, at points not otherwise indicated, where diameters are to be measured.

9th. *A trunnion square*, of steel or iron, for ascertaining the position of the trunnions with reference to the axis of the bore. This instrument is *a square* with two branches, one of which is fixed and the other moveable. The foot of each branch is in the same plane, and is parallel to the upper edge of the main piece which connects them. The latter is graduated to inches and tenths. The moveable branch slides on the main piece, and may be secured to it by two thumb screws. It is provided with a vernier scale graduated to hundredths of an inch. Between the branches there is *a slide*, also provided with a vernier graduated as before, with a thumb screw to secure it firmly; in its centre there is a *sliding point*, moving vertically, with a thumb screw to fasten it. Above the foot of each branch there is a slit to receive the shank of a plate, on the end of which a thread is cut; the lower edge of the plate forms a right angle with the branch, and the plate is fastened to the branch by a nut at a point from the end equal to the semi-diameter of the trunnion, which is marked on each branch.

When the feet of the branches or the lower edge of the plates rest upon the trunnions, the upper edge of the main piece is parallel to their axis, if their alignment is correct. When in the latter position, the edges of the feet will lie close against the sides of the trunnions.

A graduated steel wedge is used to measure the deviation of the trunnions from the feet of the square.

10th. *A trunnion gauge*, which is an iron ring of the proper diameter of the trunnions. Its outer edge coincides with the diameter of the rim bases.

11th. *A trunnion rule* to measure the distance of the trunnions from the base ring, or line. This is an *iron rod* with a head at one end, through which passes one branch of a small *square*. The centre of the rod is marked on the end, and the square is set so that the inner edge of the branch, which is parallel to the rod, is at a distance equal to the semi-diameter of the trunnion from the centre. It is secured in this position by screws and clamps.

The upper side of the rod is graduated to inches and tenths. A *slide*, with a slot through it to show the graduation beneath, traverses upon it, and is kept from turning by a guide on the lower side. There is a vernier upon the slide graduated to hundredths of an inch; a thumb screw serves to secure the slide at any point on the rod. That end of the slide from which the graduation of the rod commences, has both of its sides drawn out to form knife edges; the knife edges and the end of the slide are in the same plane. When the square at the end is placed on the trunnion, the end of the rod will touch its side at the point of its greatest diameter. The rod being held parallel to the axis of the bore, with the side of the head pressing the rim base, the knife edge will be in a proper position to fall into the base line when moved to find it.

12th. *A beam caliper* form easuring diameters, is a *square*, of steel or iron, with two branches, one of which is fixed and the other sliding. The inner edges of the two branches, when pushed together, lie, of course, in contact with each other throughout their length. The beam is graduated to inches and tenths. A vernier is attached to the sliding branch, graduated to hundredths of an inch. The latter is provided with a thumb screw to fasten it at any point.

The length of the beam must be rather greater than the diameter; and that of the branches than the semi-diameter of the guns to be inspected, at their largest points.

13th. A *cascabel block* is a wooden cylinder, of the proper diameter of the breeching hole, the size of which it is used to verify.

The opening between the jaws may be ascertained by measuring the iron block which is fitted to go between them, or by a template.

14th. *A vent guide*, to be used with vents in guns of Dahlgren's pattern.

This instrument is made of bronze or composition. When placed upon the gun, one of its branches coincides with the curve of the cylinder, and the other, starting from its centre, lies along the cylinder in contact with it longitudinally. The lower edges of the branches are a right line and a curved line, making two right angles with each other. The length of that of the transverse branch is equal to the distance between the centre of the two vents. The rear surface of the transverse branch is curved and quadrilateral. Its sides are inclined so that their rear edges show the exact direction of the vents. Every point in the upper edge lies in the same horizontal plane. The height is sufficient to permit the edges to give an accurate direction to the drill.

The upper edge of the other branch runs off in a sloping curve to its extremity.

A centre line is drawn through the lower edge of the longitudinal branch, and is continued upwards on the rear surface of the transverse branch to the top.

The guide being placed with its centre upon the centre mark of the gun, and the centre line of the longitudinal branch being made to coincide with the centre line scribed upon the cylinder, the rear lower edge of the transverse branch will then coincide with the base line, its extremities will indicate the centres of the vents, and the rear edges of the sides will show their true direction.

15th. *Vent gauges*, of untempered steel wire, with shoulders to prevent them from slipping into the vent. One should be of the proper diameter of the vent; one of the greatest; and one of the least diameter allowed.

16th. *A vent searcher;* a steel wire of the length of the vent, bent to a right angle at the lower end, and pointed. It is used for detecting imperfections in the sides of the vents.

17th. A semi-circular protractor, of metal, for measuring the inclination of vents, or for ascertaining their deviation from the guide.

18th. A set of templates for verifying the shape of lock lugs, the angle of the rear sight mass, the curve between the base line and the front of rear sight mass, that at the end of the cascabel, the vent of the breeching hole, the opening of the cascabel, the shape of the muzzle swell, &c.

If the inspection should take place at the foundry, the templates used in chipping might be verified and used for inspection.

N. B.—For guns of Dahlgren's pattern, a bronze model, showing the shape of the lugs and rear sight mass, and the position of the vents, has been furnished as a guide to the contractors.

19th. *A standard foot rule* for verifying measures.

20th. A foot rule, of steel, for measuring the masses, the length of the trunnions, and for other purposes. The graduation should be extended to each end.

21st. *A set of ring gauges*, large, medium, and small, for inspecting the projectiles used in proof.

22d. *A small beam caliper*, with outside edges, for examining the adjusting rings and the ring gauges.

23d. *A platform balance* for weighing the projectiles used in proof, and for bringing the shells up to the standard weight. For use with the above there should be provided a *bag of dry sand*, a *funnel*, some *wooden plugs* for the fuze holes, and a *hammer*.

24th. *A set of implements* for loading and cleaning, viz:

A rammer, faced with hard wood or metal, with a graduated scale on the staff, near the muzzle, to show the distance of the front of the projectiles from the muzzle.

A bristle sponge, with a worm on its end, for ordinary use in firing.

A sheepskin sponge for drying the bore after cleaning it.

A gun scraper.

A ladle.

A boring bit.

A priming wire.

A lock and laniard, should navy primers be used in firing. But if friction primers are used, then a laniard, with a hook in its end, will be required only.

A breeching and a couple of tackles, if the guns should be fired on skids.

Six handspikes.

Six buckets and a large tub for washing out the guns.

And if the firing is made into a butt, then a couple of wheelbarrows, with two or three pick-axes and half a dozen shovels, will be necessary.

25th. *A searcher*, with six or more points, to detect injuries or cavities in the bore.

26th. A machine for taking the interior impression of vents.

This consists of a wooden *head*, of the shape of the bore or chamber, being rather smaller than the parts that they are intended for. A *staff*, flat on its upper side is mortised into the circumference of the cylindrical part of the head. A mortise is cut through the chamber part of the head extending several inches in rear and front of the position of the vent. Into this mortise a piece is fitted, capable of free motion upwards and downwards, the top of which is fitted with holes to secure the wax, or composition, which is spread over its surface. A plate of lead one-fourth of an inch thick is fastened to the bottom. This *moveable piece* rests on a wedge attached to a flat rod running through a slot in the head. There is a slot in this rod about four inches long, a pin passing through it into the staff. *To use the instrument*, withdraw the rod as far as the slot will permit, which will allow the moveable piece on which the composition has been spread to drop below the surface of the head, and protect it. Push the head to the bottom of the chamber, and arrange the position of the staff so that the moveable piece will cover the vent. Then press the end of the rod home. This motion will throw out the composition, and a distinct impression of the vent and of fire cracks (should there be any) will be left upon its surface. Draw the rod back as far as the slot will allow and withdraw the instrument. The impression being protected thereby will come out uninjured.

Impressions of injuries or cavities in the bore may easily be taken by a similar contrivance.

27th. *Hydraulic pump and apparatus* for the water-proof.

Any of the various patterns of this machine may be applied to the proof of guns. An iron cross-head is secured to a stout wooden block, which fits into the muzzle, and which has a flange or shoulder to cover the muzzle face. Rings, of caoutchouc or gutta-percha, are placed between them. An iron rod, with a ring in one end to fit over the trunnion, and with a thread cut on the other end, is used on each side of the gun to connect the trunnion with the cross-head. The whole is set up with nuts, and the pressure upon the rings makes a tight joint. A coupling upon the cross-head receives the hose, and the water is forced into the gun through a hole in the wooden block. Care should be taken that the valve is loaded with the proper weight for proof.

28th. *Dies for marking guns.* A full set of figures, with such capital letters as may be required for the inspection marks; these should be one inch in length. Also, small letters of suitable size to mark "lbs.," and a full set of half-inch figures.

PRESERVATION OF GUNS.

57. Guns received at Navy Yards are to be carefully placed on the ranges of masonry, capped with iron skids or bars. It is intended that these shall be so high that the guns may be rolled upon them without their trunnions touching the ground, and that the earth will not be beaten up against their muzzles by heavy rains.

58. The surface over which guns are to be stowed should be kept firm and clear of all vegetation, and for this purpose should be covered with cinders from the smiths' forges, or other substance unfavorable to or destructive of the growth of plants and grasses.

59. In stowing the guns they should be made to rest on one of the skids or bars, a little forward of the base-ring, the muzzle depressed, but not so much as to prevent the use of the sponge to clean out the gun; the axis of the trunnion of each to be inclined the same way, and just enough not to touch the adjoining gun; the vents to be upwards.

60. Before the stowage is finally made they should be carefully and thoroughly cleaned from rust and all improper coatings, and be lacquered internally and externally with such composition as may be directed by the Bureau. This should be applied, when practicable, when the guns are well warmed by the rays of the sun. The vents and all screw holes are to be stopped with plugs made of soft wood or oakum dipped in tallow, after they have been protected by an application of beeswax dissolved in spirits of turpentine or other composition that may be directed by the Bureau.

61. No tompions are to be put into the guns when they are stowed unless expressly directed by the Bureau; if so ordered, a score must be cut out from them on the lower side half an inch wide and equally deep.

62. In lacquering guns care is to be taken to leave the distinguishing marks and numbers distinctly visible.

63. Shell-guns are always to be denominated by the diameter of the bore; shot-guns by the *weight* of their shot.

64. Guns of the same calibre and class, when it can be conveniently done, are to be stowed in the same tier or range, and those of each class belonging to or selected for any particular vessel kept together. Each tier or range of guns of a particular calibre or class is to be marked accordingly with paint on a sign-board, and the first gun of each class belonging to a vessel is to be marked with the name of the vessel.

65. The Officer on Ordnance duty will examine all the guns in the yard and on board vessels in ordinary at least once in every two weeks, and take care that they are kept protected from rust or any other injury, and will report to the Bureau whenever any additional precautions or arrangements are required for their proper preservation, and which may not be furnished by the order of the Commandant of the Yard.

66. No cutting, boring, or chiselling of guns is to be done at any time without the express authority of the Bureau.

67. No condemnation of guns or small arms belonging to the Navy is to be made, except upon surveys specially ordered and confirmed by the Chief of the Bureau, nor of other articles which have been furnished under his authority or by his direction, unless by surveys ordered or sanctioned by him.

68. When guns and their equipments are to be put on board vessels for their armament, the guns are to be carefully and thoroughly cleaned and examined, to see that they are in all respects in proper serviceable condition.

The vents should be examined with the vent-gauges and searchers, to see that they are clear from any substance which may obstruct the use of priming-wires and primers.

69. The carriages are also to be carefully examined, the trunnion-holes and arms of the axletrees cleaned and saturated with boiled linseed oil, the cracks filled with putty and rubbed smooth, and the trunnion-holes black-leaded. The iron work should be freed from rust, all screws be made to work easily, and be well cleaned and coated with proper composition.

70. The Ordnance Officers will see that the sights are properly fitted and marked for their proper guns. The greatest care should be taken that they are properly adjusted, as the efficiency of the ship depends on it, and it is difficult to detect or remedy any error after they are placed on board; that the beds and quoins are fitted and adjusted, and the quoins graduated to degrees or distances to correspond with those marked on the sight-bars. Porter's quoin is adopted for all carriages requiring them.

71. New guns are to have locks fitted to them before being put on board ship. Those having two lugs will have the one on the right fitted; the other is to be left solid.

72. When guns are to be shipped for *transportation* merely, the same precautions are to be taken to guard them from injury as on shore, with the addition of a wad dipped into the composition which covers the bore, thrust into the muzzle and connected with the tompion by a laniard.

73. At the termination of a cruise the guns composing the battery of every vessel-of-war of the United States shall be carefully examined by the Ordnance Officer of the Yard and such others as may be directed, with the view to discover and report any injuries which they may have sustained in service, or any defects which may not have been developed in the original proof. In this examination the attention of the Inspecting Officers is to be directed to the following points, viz:

Indentations or hollows produced by the shot *balloting* against the surface of the bore, or by the action of the gases.

Cuts or *scratches* in the bore, produced by fragments of broken or the roughness of imperfect shot.

Roughness or *corrosion* of the metal on the exterior, produced by neglect or exposure.

Similar injuries in the bore, or any enlargement of the bore, which is to be ascertained by measuring with the star-gauge, at every one-fourth (¼) of an inch at the seat of the shot, every inch to the trunnion, thence every calibre to the muzzle, and the results recorded in the usual form and reported to the Bureau, that they may be compared with those noted at the original inspection.

Care is to be taken that the distinguishing marks and numbers are always accurately noted, that the correct history of each gun may be preserved.

74. Before sailing the Inspector of Ordnance will furnish the commander with a statement of the number of times each gun on board has been fired, which list will be returned to the Inspector of the Yard to which she may return, with all additional firing noted opposite the number of each gun certified "correct" by the commander.

The protracted firing to which the Navy cannon have been subjected, and to which they will continue to be liable, renders it necessary not to exceed the number of fires designed for each vent.

These must never exceed five hundred (500) fires for each vent.

In the IX-IN., XI-IN., and guns of similar form, the right vent is always bored through, and the left initiated sufficiently to give it direction.

When five hundred (500) rounds have been fired from the right vent, it is to be closed by filling it with molten zinc or lead, and the left vent is to be bored, which will require a skilful mechanic.

When the left vent has been fired five hundred (500) rounds, the gun is to be disused, as it will then have been fired one thousand (1,000) times.

It may happen, from some peculiarity in the nature of the iron, that the vent may be worn to its full extent before five hundred (500) rounds have been fired, in which case the vent is then to be closed, and the other vent opened.

75. As the best indication of the amount of firing to which any gun has been exposed, when it is not otherwise known, is given by the enlargement of the vent, particular attention will be paid, in the reinspection of the guns, to this point. The standard gauge will be used to ascertain the general enlargement, and the searcher to detect defects which may have been developed in firing. Impressions are to be taken of the lower orifice of the vent with softened wax, and if they show that the vent is corroded in furrows and enlarged considerably in diameter at its junction with the bore, a permanent impression is to be taken in lead to show the conical enlargement. The following manner, practiced at the Experimental Battery at Washington, is recommended:

IMPLEMENTS REQUIRED.

1. *A soft wire* about 0.07 in. diameter, and 3 or 4 faths. long.

2. *A lever* about twice the length of the bore, and about 3 inches in diameter, and shod to suit the curve of the bore nearly.

3. *A small button of lead*, judged to be of sufficient size to fill the vent at least one inch from the bore. This is to be pierced lengthwise to receive the wire.

TO TAKE THE IMPRESSION.

"Shove the wire through the vent, let it pass along the bore and out at the muzzle; put it through the leaden button and tie a knot at the end. Draw the wire back through the vent until the leaden button is introduced firmly into the inner orifice.

"Apply the lever, making its shoe bear on the button, and force it well in by repeated blows, the muzzle being the fulcrum. This done, disengage the button by pushing in the priming-wire."

76. Whenever a gun shall give away under fire, or an *accident* of *any kind* happen to one, the Bureau desires to be immediately informed of *all* the facts in relation thereto.

Particular attention should be paid to the following points:

1. The manner in which the gun was loaded, stating the charge and kind of powder used, and character and weight of projectiles.

2. The condition and appearance of the gun after it gave way, and what effect was produced on the carriage by the explosion.

3. What injuries, if any, occurred to the crew of the gun or vessel.

Sketches of the gun and fragments which remain should also be sent, accompanied by the written statement in detail of the officers in immediate charge of the gun.

PRESERVATION OF SHOT AND EMPTY SHELL.

77. All round shot and shell are to be cleaned from rust and covered with a thin lacquer of such composition as may be directed by the Bureau when they are first received and when they are restowed.

78. For the present the following colors are established when put on board ship: All *shot,* black; *shell,* red; *shrapnel,* white; length of fuze stencilled on the shell. Special kinds of shell, as may be directed by Bureau. (Crane's shell, *yellow;* Percy, *blue.*)

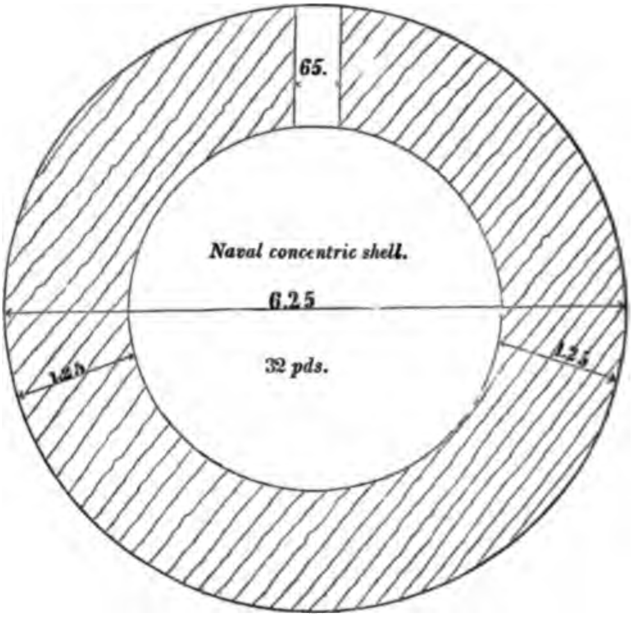
79. Empty shell are to have the fuze bouching coated with such composition as may be directed, and, unless otherwise ordered, be stopped by a plug of *very soft* wood, well coated with a mixture of oil and tallow, *screwed* into them. The ends of the plugs should not be sawed off even with the shell, but left square and project sufficiently to allow them to be unscrewed by means of a wrench.

They are to be piled with the fuze-holes down, and free from contact; under cover when practicable, but with free ventilation.

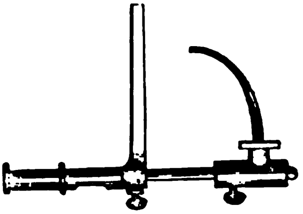
80. Platforms of masonry, or of condemned shot, are to be prepared to pile shot and shell upon, and are not to be wider, if space can be found, than to stow fourteen 32-pdr. shot, or not exceeding eight feet in width. Square piles are to be preferred where there is room, but where this may be deficient the piles may be extended in length.

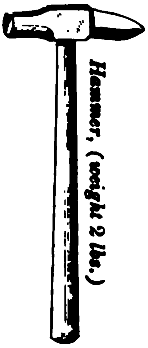
81. Shot and shell, after having been piled, are to be so far examined in the first week of June in each year as to ascertain if they require to be cleaned, relacquered, and repiled to secure their proper preservation; and their condition reported to the Bureau, that if any work upon them is necessary it may be finished during the warm months of the year, when the lacquer can be best applied.

82. Whenever shot or shell are to receive lacquer care must be taken that the quantity applied does not increase the diameter more than is indispensably necessary, and in no case above the established high gauge. Old lacquer and rust should be removed by scraping, as far as can be conveniently done before a new coating is applied. For use at the navy yards, a milling machine performs this very expeditiously. Neither hammering nor heating is to be used for this purpose.

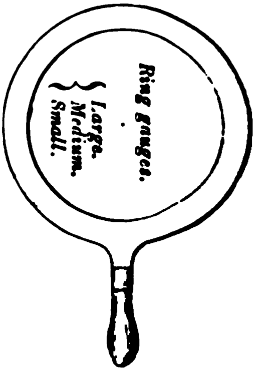


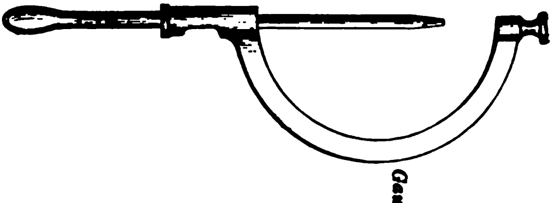
Callipers for thickness at right angles with axis of fuze-hole.



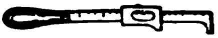


Hammer, (weight 2 lbs.)





Gauge for thickness opposite fuze-hole.



Gauge for thickness at fuze-hole.

INSPECTION OF SHOT AND SHELLS.

RULES AND MEMORANDA FOR THE GOVERNMENT OF INSPECTORS.

83. All shot and shells for the naval service must be—

1st. Made from gray or mottled charcoal pig iron.

2d. This iron must not be blasted with anthracite coal.

3d. It must be poured into sand moulds.

84. After being cast in this manner, the shot and shells must be—

1st. Spherical.

2d. Smooth on the surface.

3d. Free from the defects named in the following rules for the use of the inspecting instruments:

FOR SHOT.

85. *Inspecting instruments.*—One *large, small,* and one *medium ring gauge,* and one *cylinder gauge* for each calibre. The *cylinder gauge* shall have the same diameter as the large gauge, made of cast iron, and three calibres in length. One *hammer* weighing two pounds, and having a flat face and a conical point; one *searcher,* of steel wire, with a handle; one pair of *calipers* and *standard scale;* one *cold chisel;* steel punches.

86. After having been well cleaned, each shot is placed upon a table and examined to see that its surface is smooth, and that the metal is sound and free from seams, flaws, and blisters. If clusters of cavities or small holes appear on the surface, strike the point of the hammer into them, and ascertain their depth with the searcher. If the depth of the cavity exceeds 0.2 inch, the shot shall be rejected; it shall also be rejected if any attempt is made to conceal defects by plugging or filling holes in any mode whatever.

87. The shot must pass *in every direction* through the large gauge, and *not at all* through the small one; the calipers and scale will determine exactly the difference of diameters of the same projectile.

88. The ring and cylinder gauges shall be examined before each inspection, and when found to have enlarged 0.01 of an inch, must be laid aside and marked as unserviceable.

NOTE.—After numerous experiments upon different lacquers employed for the preservation of shot and shell from rust, the French have abandoned all of them.

The shot and shell are simply piled in the open air, and when put on board ship cleaned of rust and rubbed over with whale oil—the same means adopted every three months during the cruise.

89. The shot are next to be passed through the *cylinder gauge*, placed at an inclination of about two inches between the ends, and supported in such a manner as to be easily turned from time to time, to prevent its being worn in furrows. Shot which slide or stick in the cylinder shall be *rejected;* the latter must be pushed out from the lower end of the cylinder with a wooden rammer.

90. The next proof of shot is to drop a few taken indiscriminately from the lot under inspection from a height of twenty feet on a solid platform of iron, or roll them down an inclined plane of the same height against a mass of iron; after which they are again examined for defects of metal.

91. The average weight of shot shall be determined by weighing at least three parcels, of from 20 to 50 each, taken indiscriminately from the lot. As many of the lightest shall be weighed separately as the inspecting officer may deem necessary, and all found to fall below the least weight allowed in the annexed table of the dimensions of shot and shells shall be rejected.

SHELLS.

92. Shells should be cast on a half-inch hollow spindle, to allow the gas to pass freely from the core; the fuze-hole would then be sufficiently large to admit the gauge for thickness before the shells leave the foundry.

93. *Inspecting instruments.*—In addition to the instruments for shot, there will be required *calipers with steel points* for measuring the thickness of the shell at points on the great circle at right angles with the axis of the fuze-hole; *gauges* for the thickness at and opposite the fuze-hole; a *conical flat steel gauge* for the fuze-hole, marked at the point to which it should enter; a pair of *strong hand bellows*, with a wooden plug to fit the fuze-hole and the nozzle air-tight.—(See Plate.)

INSPECTION.

94. The surface of the shell and its exterior dimensions, form, weight, and strength, are to be examined and tested as in the case of shot, and subject to all the conditions there specified.

95. The greatest care is to be taken to remove every particle of sand or fragment of iron from the interior when they are about to be loaded for service. And the Inspectors of Ordnance at foundries or navy yards will satisfy themselves that this has been done before accepting or preparing them for service.

96. The shell is next struck with a hammer, to judge by the ring or

sound whether it is free from cracks; and the exterior and interior diameters of the fuze-hole (which should be accurately reamed) are to be verified, and the soundness of the metal about the inside of the fuze-hole ascertained. To determine the thickness of the metal, three points, at least, on the great circle at right angles to the axis of the fuze-hole are to be measured; also one at the fuze-hole and one at the bottom. No shell shall be received which deviates more than one-tenth of an inch from the proper thickness in any part.

97. The shell is next placed in a tub of water, which should be deep enough to completely cover the shell. Air is then forced by the bellows into the shell. If there are any holes in it, air bubbles will rise on the surface of the water, and the shell shall be rejected.

98. This occasionally occurs from the escape of air from porous spots which do not extend to the interior of the shells. In this case the action of the bellows produces no increase of bubbles, which cease rising as soon as the spots or cavities are filled with water. Porous spots are also detected by their absorbing water and drying slowly when exposed to the air, and shall likewise cause the rejection of the shell.

99. The Inspecting Officers will stamp the shell near the fuze-hole with their initials, also those of the foundry at which they are cast.

100. Rejected shells are to be mutilated by chipping a piece out at the fuze-hole.

Table of shot and shell gauges, &c.

SHOT.

Dimensions, weight, &c.	XV. (Cored.)	XIII.	XI.	X.	IX.	8.	32.
Diameter of large gauge for foundries...	14.83	12.83	10.83	9.83	8.83	7.88	6.28
Diameter of small gauge for foundries...	14.77	12.77	10.77	9.77	8.77	7.82	6.22
Mean of gauge for foundries............	14.80	12.80	10.80	9.80	8.80	7.85	6.25
Mean weight required of foundries...lbs	400	276	166	124	90	65	32.5
Least weight allowed foundries.....lbs						64.5	32
Diameter of small gauges for service ... 1st class..in						7.82	6.22
Diameter of small gauges for service ... 2d class..in						7.80	6.20

SHELL.

Dimensions, weight, &c.	XV.	XIII.	XI.	X.	IX.	8.	32.
Diameter of large gauge for foundries	14.83	12.83	10.87	9.87	8.87	7.88	6.28
Diameter of small gauge for foundries	14.77	12.77	10.83	9.83	8.83	7.82	6.22
Mean of gauge for foundries	14.80	12.80	10.85	9.85	8.85	7.85	6.25
Thickness Proper	2.85	2.37	2.00	1.80	1.60	1.50	1.25
Thickness Greatest	2.95	2.47	2.10	1.90	1.70	1.60	1.35
Thickness Least	2.75	2.27	1.90	1.70	1.50	1.40	1.15
Diameter of fuze-hole Proper and least	.65	.65	.65	.65	.65	.65	.65
Diameter of fuze-hole Greatest	.75	.75	.75	.75	.75	.75	.75
Diameter of large gauge for strapped..in.	14.93	12.93	10.93	9.93	8.93	7.93	6.33
Mean weight required for foundries...lbs.	330	208	127	95.0	68.50	50	25.0
Least weight allowed foundries for any one			126	94.0	67.50	49	24.5
Weight of filled and sabotted	352	216.5	135.5	101.50	73.50	52.75	26.5

For gauges of boat-gun fixed ammunition see Boat Armament of United States Navy, by Admiral Dahlgren, 2d edition, 1856.

101. If, upon the inspection of shot or shells, any of them should be found not to conform strictly to these instructions or to the requirements of the contract under which they are offered for reception, the Inspecting Officer is not to receive them; but if, in his opinion, the defects, taken in connexion with the general character of the articles, will not impair their efficacy or render them unsafe or hazardous, he may refer to the Chief of the Bureau of Ordnance for his decision, forwarding to him minute and full information on the subject.

102. Shot and shells shall be delivered for inspection at the places specified in the contract, at the expense of the contractor; and those which are rejected shall be immediately removed, also at his expense.

103. Shot of the *first* class, or which do not exceed 0.18 of an inch windage, are to be entirely black, and those of the *second* class, having from 0.18 to 0.20 of an inch windage, to be marked partly white. Each class is to be piled and kept separate from every other. Both classes are to be considered and supplied as "serviceable shot;" but are to be stowed separately on board ship, and the returns to the Bureau are to show the number of each, respectively. The number of those having more than 0.20 of an inch windage are to be reported and retained until special orders may be given for their disposition. In case any should be taken as the foundation for piling serviceable shot, they are to be painted entirely white and their number returned *as unserviceable.*

PILING OF BALLS.

104. *To find the number of balls in a pile.*—Multiply the sum of the three parallel edges by one-third of the number of balls in a *triangular face.*

In a *square pile* one of the parallel edges contains but one ball; in a *triangular pile* two of the edges have but one ball in each. The number of balls in a triangular face is $\frac{x(x+1)}{2}$; x being the number in the bottom row. The sum of the three parallel edges in a triangular pile is $x + 2$; in a square pile, $2x + 1$; in an oblong pile, $3X + 2x—2$; X being the length of the top row, and x the width of the bottom tier; or $3m—x + 1$; m being the length, x the width of the bottom tier.

If a pile consists of two piles joined at a right angle, calculate the contents of one as a common oblong pile, and of the other as a pile of which the three parallel edges are equal.

105. *Table giving the number of balls in a triangular pile, the base of which is X.*

Value of—		Value of—		Value of—		Value of—		Value of—	
X.	S.	X.	S.	X.	S.	X.	S.	X.	S.
1	1	6	56	11	286	16	816	21	1771
2	4	7	84	12	364	17	969	22	2024
3	10	8	120	13	455	18	1140	23	2300
4	20	9	165	14	560	19	1330	24	2600
5	35	10	220	15	680	20	1540	25	2925

106. *Table giving the number of balls contained in a square pile, the base of which is X, and in a rectangular pile, the sides of which are X & X + N.*

Value of X.	Differ'ces.		Value of N.											Differ'ces.	
	2d.	1st.	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	1st.	2d.
2	7	9	5	8	11	14	17	20	23	26	29	32	35	3	3
3	9	16	14	20	26	32	38	44	50	56	62	68	74	6	4
4	11	25	30	40	50	60	70	80	90	100	110	120	130	10	5
5	13	36	53	30	85	100	115	130	145	160	175	190	205	15	6
6	15	49	91	112	133	154	175	196	217	238	259	280	301	21	7
7	17	64	140	168	196	224	552	280	308	336	364	392	420	28	8
8	19	81	204	240	276	312	348	384	420	456	492	528	564	36	9
9	21	100	285	330	375	420	465	510	555	100	645	690	735	45	10
10	23	121	385	440	495	550	605	660	715	770	825	880	935	55	11
11	25	144	506	572	638	704	770	838	902	968	1034	1100	1166	66	12
12	27	159	650	728	805	884	962	1040	1118	1196	1274	1352	1430	78	13
13	29	196	819	910	1001	1092	1183	1274	1365	1456	1547	1638	1729	91	14
14	31	225	1015	1120	1225	1330	1435	1540	1645	1750	1855	1960	2065	105	15
15	33	255	1240	1360	1480	1600	1720	1840	1960	2080	2200	2320	2440	120	16
16	35	286	1496	1632	1768	1904	2040	2126	2312	2448	2584	2720	2856	136	17
17	37	324	1785	1938	2091	2244	2397	2550	2703	2856	3009	3162	3315	154	18
18	39	361	2109	2280	2451	2622	2793	2964	3135	3806	3477	3648	3819	111	19
19	41	400	2470	2660	2850	3040	3239	3420	3610	3800	3990	4180	4370	190	20
20	43	441	2870	3080	3290	3500	3710	3920	4130	4340	4550	4760	4970	210	21
21	45	484	3311	3542	3773	4004	4235	4466	4697	4928	5159	5390	5621	231	22
22	47	529	3795	4048	4301	4554	4807	5060	5313	5566	5819	6072	6325	253	23
23	49	576	4325	4600	4876	5152	5428	5704	3980	6256	6532	6803	7084	276	24
24	51	625	4900	5200	5500	5800	6100	6400	6700	7000	7300	7600	7900	300	25
25	53	676	8525	5850	6175	6500	6825	7150	7475	7800	8125	8450	8775	325	26

The number contained in a square pile is found in the column 0 opposite the number X.

In a rectangular pile let the smaller side be 19 = X, the longer side be 26 = X + N. Then N = 7. Under 7 and opposite 19 we have 3800. This table may be indefinitely extended by the aid of the columns of differences.

SHELL.

107. The fuzes for shell will be prepared at the laboratory in the navy yard at Washington, and distributed to other navy yards as they may be required. All fuzes taken from shell, or returned from ships which have been more than one year in service, are to be sent to the laboratory to be refitted. Fuzes of over two years date of manufacture are not to be issued for service but returned to the laboratory.

108. The charges of powder for *spherical shell* are to be as follows:

	XV-inch.	XI-inch.	X-inch.	IX-inch.	VIII-inch.	32-pounder.	Boat and field howitzers.	
							24-pdr.	12-pdr.
	Lbs	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
Bursting or service charge	13.	6.00	4.00	3.00	1.85	0.90	1.0	0.5
Blowing charge.........	1.0	0.25	0.25	0.25	0.25	0.25		

NOTE.—The weight of charges for shells will vary slightly from those given in the table, according to the size of the grain and density of the powder.

109. The number of shell to be kept fitted at the navy yards will be determined by special directions from the Bureau.

110. All shell shall be filled with musket powder of the highest initial velocity. The shell must be *filled*, and the powder well shaken down, leaving only room for the insertion of the fuze. A wooden plug the size of the lower part of the fuze will always determine this. The very common but slovenly practice of filling the shell, and then pouring out a quantity sufficient to allow the fuze to be inserted, is expressly prohibited. Shell have also been returned with the powder in the vicinity of the fuze compressed into a solid mass, owing to the fact that sufficient room had not been left for its insertion.

111. The date when shell are fuzed or filled, as well as that on which any of these arrangements are changed, or the shell are examined before issue to vessels, together with the initials of the officer superintending these operations, should be legibly written and pasted on the shell.

112. The Ordnance Officer, or the Gunner of the Yard, is to see the shell supplied to all vessels properly conveyed on board, superintend the stowage, and furnish the Commanding Officer with a statement showing the number of each description of shell and fuze, and a plan of their stowage.

113. The condition of the shell, and especially of their fuzes, is to be frequently and carefully examined into, taking out a fuze occasionally so as to detect any injury which may arise from moisture, and to have such as may be found damaged replaced by the spare fuzes.

Boat shell and their spare fuzes are also to undergo a similar examination.

Shell have been sometimes returned with their fuzes entirely destroyed by moisture!!

114. It has been found recently, on drawing the charge of a 12-pounder howitzer in one of the small gunboats, that in cutting its fuze (Bormann) the incision had been made *directly into the magazine.*

Had the gun been fired, the explosion of the shrapnel must have occurred at the muzzle of the gun.

There is no doubt such errors will often account for the supposed defects of the fuze.

The attention of officers is therefore required to this subject; and, in making reports of defective ammunition, &c., samples should be forwarded to Washington for examination.

It is of the gravest importance, not only because it involves the failure of the shell to act properly upon the object of fire, but may also endanger the lives of our own men.

115. Whenever it is expedient or necessary to examine the fuzes and loading of shell which have been already prepared, great care must be observed in removing the fuze.

116. The fuze stock may generally be safely unscrewed with the fuze wrench, taking care, in the first place, to strike the side of the shell gently to detach the powder from the fuze, to work very slowly, and not to endeavor to overcome any unusual resistance.

117. Whenever it shall be necessary to load and fuze shell on board ship—a properly secured place being first prepared, as directed by the Captain—the shell being strapped and sabotted, are to be examined to see that they are clean, both inside and out, and thoroughly dry. The greatest care is to be taken to remove every particle of sand or fragment of iron from the interior. The prescribed charge of powder is next to be poured into them through a proper funnel; any grains of it which may remain sticking to the thread of the bouching are to be brushed away carefully, and then, after putting a *light* coat of lacquer for small arms, or sperm oil, on this thread and on that of the fuze, the latter is to be screwed in carefully with the fuze wrench. The lacquer should be of the consistency of cream, and when, from evaporation, it becomes too stiff, should be thinned by adding more spirits of turpentine.

118. In emptying shell they are to be handled carefully and placed on a bench with a hole in it to receive and support the inverted shell. A wooden vessel placed below will receive the powder. Should the powder have become caked so as not to be easily removed from the shell, it is to be drowned and removed by washing out the shell. A handful of small iron shot put in the shell will facilitate this operation.

119. Loaded shell are to be painted red and placed in boxes or bags marked with a red cross, which boxes are to have the lengths of fuze painted on them in black. Shrapnel shell and their boxes shall be painted white, with the length of fuze stencilled on them in black. They are to be stowed in shell-houses prepared for that purpose. Loaded shell, whether in or out of their boxes, must be handled carefully. Shell-bags will be preserved, accounted for by the Gunner, and returned.

120. The greatest precaution must be taken in handling loaded shells fitted with percussion fuzes. When returned from ships they must not be taken into the shell-houses until after the fuzes shall have been removed and the shell plugged.

121. Shell-houses, and the general condition of the shell they contain, are to be examined as often as once a fortnight by the Ordnance Officer, and every precaution taken to keep them as dry as possible.

122. The *shell* for boat guns are to be stowed in "the shell-houses" on shore, and "shell-rooms" on board of vessels, in their proper boxes.

123. One-fourth of the whole number of spare fuzes allowed for the great guns is to be for 5 seconds of time; one-fourth for 10 seconds; one-fourth for 15 seconds; one-fourth assorted.

124. *All the spherical shell*, however, put on board ship, and fitted for *immediate* use, are to be provided with none other than the 5-second fuze.

125. For rifled cannon the shell shall be fitted with one-half percussion one-half time fuze. Parrott's shell will have 10 per cent. of rings for the naval time fuze.

126. At ranges exceeding 1,400 yards the 10 or 15 second fuzes, according to such excess, are to be substituted for the 5-second fuze, by removing one and putting in the other; or, if preferred, those fuzes may be applied to shell which are not already fitted. The 5-second fuze is to be regarded as the general working fuze, and hence the reason the shell are to be fitted with it, as mentioned above.

127. The different kinds of fuzes shall be made up in separate packages, distinctly marked with the kind and length of fuze, and their use carefully explained to the Executive Officer and Gunner by the Inspector of Ordnance.

128. In consequence of numerous reports received from vessels in service of the inefficiency of certain fuzes, commanders of vessels are required to observe carefully the action and result of all fuzes, and report in detail to the Bureau of Ordnance whenever opportunities may occur, particularly specifying the number and kind fired, elevation of gun, range, premature explosions, failures to explode, and satisfactory action. Also, whether the fire was direct or ricochet.

129. EXTERIOR DIMENSIONS, IN INCHES, FOR SHELL-BOXES.

For XV-inch shell,	18	× 18	by 20	high.
For XI-inch shell,	12.75	× 12.75	by 14.5	high.
For X-inch shell,	11.65	× 11.65	by 13.9	high.
For IX-inch shell,	10.63	× 10.63	by 12.9	high.
For VIII-inch shell,	10.20	× 10.10	by 12.2	high.
For 32-pounder shell,	8.60	× 8.50	by 10.2	high.

130. AREAS OCCUPIED BY ONE TIER OF SHELL-BOXES.

XI-inch.		X-inch.		IX-inch.		VIII-inch.		32-pdr.	
No.	Ft. In.	No.	Ft. In.	No.	Ft. In.	No.	Ft. In.	No.	Ft. In.
72	15.5½ × 5.8½	75	15.2 × 5.3½	102	15.8¼ × 5.9¼	108	16×6	176	16×6
52	14.4 × 4.6½	56	14.2 × 4.1½	80	14.9¼ × 4.9½	85	15×5	140	15×5

GUNPOWDER.

STOWAGE, PRESERVATION, HANDLING, CHARGES, ETC.

131. Gunpowder intended for ordinary use in cannon is to have sufficient strength to give a 6-pounder shot an initial velocity not less than 1,500 feet, and not more than 1,550 feet, determinable by the gun pendulum of the Ordnance Yard at Washington.

132. Size of the grain is to conform to the following:

Of any given weight 20 per cent. is to remain on sieve No. 1, eight per cent., but not more, may pass through No. 3, and of the remaining 72 per cent. at least one-half is to remain on sieve No. 2, and not more than one-half may pass through. So that if 1,500 grains avoirdupois be taken there will—

	Grs. av.
Remain on No. 1	300
Remain on No. 2	540
Pass through No. 2	540
Pass through No. 3	120
	1,500

Cannon powder should have a density of about 875 oz., and not exceeding 900 oz., to the cubic foot.

133. "Powder for small arms," or "musket powder," should all pass through No. 4, about one-half through No. 5, and nearly one-fourth through No. 6, averaging from 2,000 to 2,500 kernels in ten grains troy.

All the powder should be well glazed; that for small arms more highly than that for cannon.

134. The size of the grains is determined by sieves, made by piercing round holes in thin plates of brass. These sieves are nine in number, the holes being of the following diameters, viz:

No. 1,	.12 of an inch	for cannon.
No. 2,	.10....do	
No. 3,	.09....do	
No. 4,	.06....do	for musket.
No. 5,	.05....do	
No. 6,	.035....do	
	.21....do	No. 7, for rifle cannon.
	.18....do	
	.15....do	

No. 7 powder is used in the Parrott rifles of 8-inch, 100-pounder, and 60-pounder.

135. The powder-houses or magazines on shore are to be inspected by the Ordnance Officers at least once in every two weeks, and every precaution taken to guard them against danger of explosion, and to preserve the powder dry and in good condition.

136. The powder barrels in the magazine, when there are no racks, should be placed on their sides, with their marked ends towards the alleys, three tiers high, or four tiers, if necessary, with small skids on the floor, and between the several tiers of barrels, using chocks at intervals, on the lower skids, to prevent the barrels from rolling. If it can be avoided, fixed ammunition should not be put in the same magazine with powder in barrels.

137. Should it be necessary to pile the barrels more than four tiers high, the upper tiers should be supported by a frame resting on the floor; or the barrels may be placed on their heads, with boards between the tiers.

138. There should be an unincumbered space of 6 or 8 feet square at the door or doors of the magazine.

139. Whenever practicable the barrels should be arranged in double rows, and there should be a passage-way between the rows, so that the marks on each barrel may be seen at a glance and any barrel easily reached.

140. Besides being recorded in the magazine book, each lot of powder should be inscribed on a ticket attached to the lot, showing the entries and the issues.

141. The magazine should be opened and aired in clear dry weather, the ventilators kept free, and no shrubbery or trees allowed to grow so near as to protect the building from the sun.

142. The moisture of a magazine may be absorbed by chloride of lime, or charcoal, suspended in an open box under the arch, and renewed from time to time. The use of quick lime is dangerous.

143. When powder is handled in powder-houses on shore, either for the purpose of inspection or preparation for delivery to ships, the baize-cloth is to be spread, and the people, before entering the magazine, are to divest themselves of every metal implement and empty their pockets, that nothing likely to produce fire may escape detection, and to put on the magazine dresses and slippers. The barrels must be opened only on the floor-cloth, and no metallic setter must be used in connexion with either copper or wooden hoops.

144. The attention of the Inspectors of Ordnance and Commanders of vessels is called to the Regulations regarding the stowage and service of powder and loaded shells in Magazines and Shell-rooms, ashore and afloat, and to the precautions which *must* be observed by *every one* who enters, *or approaches for the purpose of entering*, *any* Magazine or Shell-room.

The former Regulations are modified so far as to dispense entirely with the use of slippers made of *either India-rubber or woollen ;* and in lieu thereof slippers made *wholly of buckskin or cotton canvas* will be *immediately* provided. In hot climates, or in warm weather generally, the *naked* feet are preferred.

The terrible effect of the explosion of a Magazine or Shell-room, ashore or on board ship, can only be imagined. To avert it, by every human precaution, is an imperative duty with every one. The Bureau therefore directs the Inspectors of Ordnance on shore and the Commanders of *all* vessels afloat will cause the existing Powder Regulations to be read, and copies placed within the reach of every officer and man connected in the remotest degree with the service of the Magazine and Shell-rooms ; and no officer or other person is to be continued in such service who cannot within a reasonable time answer clearly and fully any questions relating to the requirements of existing Powder Regulations as contained in these "Ordnance Instructions."

145. The powder in barrels should be turned from time to time, at least as often as every three months, and, being arranged as mentioned above, the oldest powder will be at all times accessible for first delivery without disturbing that of more recent manufacture.

146. When powder is sent on board any vessel at the yard, an Ordnance Officer or the Gunner is to see it properly stowed, and the Ordnance Officer is to hand to the Captain of the vessel a statement showing the quantity of powder, number and capacity of tanks, kind of charges contained in each, with the initial velocity, maker, and date of reception, together with a list of small arm and boat ammunition, fireworks, filled and other shell and projectiles, together with all the information directed by the three articles immediately following, with such remarks as he may deem proper to secure better precaution or more convenient arrangement, together with a request that the memorandum, or a copy of it, may be delivered to the Ordnance Officer at the yard where the vessel may be laid up at the end of the cruise.

147. When cartridges are filled for issue to any vessel, the powder should be selected, as far as practicable, from deliveries made by the same person, and at the same time or date; and the tanks in which they are stowed are to be marked with white paint on the upper sides, with the same marks as the barrels from which the powder was taken, giving the date of manufacture and the maker's name.

148. Mr. Parrott has requested the Bureau to direct that No. 7 powder be used in his 60 and 100 pounder and 8-inch rifled cannon, and navy cannon powder in the 20-pounder and 30-pounder rifles, which the Bureau consents to, and it is to be conformed to accordingly.

149. Whenever powder shall be returned into the powder-houses from vessels, and the powder is emptied from the cartridges, care must be taken to have the barrels or other vessels in which the powder may be placed marked in the same manner, so that the maker's name and date of manufacture of all powder may be correctly known.

150. The names of vessels from which powder is received, the length of time which the powder has been on board, and the station on which the vessel has been employed, should also be noted and reported by the Ord-

nance Officer, that reference may be had to the notes in case it should be desired in subsequent examinations of the powder.

151. In some instances where powder in cartridges or otherwise has been condemned by survey it has been directed to be thrown overboard. This should never be done; the nitre contained, which forms three-fourths ($\frac{3}{4}$) of the powder, is still perfectly good, and can be made serviceable. In future, condemned powder will always be returned to the United States.

152. The Ordnance Officers, when they supply vessels with powder or remove any from them, are to report to the Bureau by the earliest opportunity all the information which is required to be noted by articles 147, 149, 150, immediately preceding; and when powder is received from vessels returning from cruises, or after it has been long embarked, they are to forward to the navy yard, Washington, a sample of two pounds and one-fourth, properly labelled, for every five hundred pounds landed, to be selected so as to show fair average samples of the whole, that its strength may be ascertained by the pendulum.

153. Powder for *saluting* may be purchased abroad to preserve a supply of our own proof powder for action.

154. When a vessel is about to leave a foreign station to return directly to the United States, and other vessels belonging to the Navy are to be left on the station without a full supply of powder, the vessel which is about to leave may be directed to transfer to those remaining on the station any excess of powder that may be on board beyond fifty rounds.

155. Should it become necessary to use powder for service charges which has not been regularly inspected and proved in the manner required by regulations, such tests of it must be made as circumstances will admit.

The ranges given by it may be compared with those of service powder of known good quality under the same circumstances. If deficient in strength, the quantity of the charges should be increased until the ranges are equalized, in order that the sight-bars may still indicate the proper elevations for each charge and distance.

156. When receiving or landing powder the red flag is to be always hoisted at the fore, and all proper precautions taken to guard against accidents from fires and lights. The tanks should be passed through the ports most convenient to the magazines, and landed on mats, to prevent injury.

157. When avoidable, gunpowder is not to be sent from vessels to powder-houses, nor from powder-houses to vessels, in wet weather, nor

when there is a probability of wetting the barrels or cases; and the packages should be conveyed in covered boats or wagons showing *a red flag*.

158. The wharf or landing place should be spread with old canvas, so that the barrels or cases may not come in contact with and convey sand or gravel to the powder-house. The barrels should not be rolled but carried in slings.

159. The red flag is always to be hoisted at the powder-houses when they are opened.

160. *The service charges* for the different calibres and classes of guns which are now used in the navy are to be as follows, and the cartridges are to be filled accordingly, viz:

Service charges for naval guns.

Ordnance.		Charges of powder.			Diameters of cartridge gauge.	Saluting charges No. 50.
Calibre.	Weight.	For distant firing, ℔.	For ordinary firing, ℔.	For near firing, or two projectiles, ℔.		
					Cylindrical.	
64-pdr.	106 cwt.	16 lbs.	12 lbs.	8 lbs.	7.00 inches.	6 lbs.
32 "	61 "	10 "	8 "	6 "	5.50 "	4 "
32 "	57 "	9 "	8 "	6 "	5.50 "	4 "
32 "	51 "	8 "	7 "	5 "	5.50 "	4 "
32 "	46 "	7 "	7 "	5 "	5.50 "	4 "
*32 "	42 "	6 "	6 "	4 "	5.50 "	4 "
*32 "	33 "	4½ "	4½ "	4 "	5.50 "	4 "
*32 "	27 "	4 "	4 "	3 "	5.50 "	3 "
Shell guns.				For near firing.	Conical.	
XV-inch.	42,000 lbs.	35 "	35 "	35 "		
XI "	15,700 "	20 "	15 "	15 lbs.	11 × 5.5 × 11	7 "
X "	12,000 "	15 "	12½ "	12½ "	10 × 5.0 × 10	6 "
IX "	9,000 "	13 "	10 "	10 "	9 × 4.5 × 9	5 "
					Cylindrical.	
8 "	63 cwt.	9 "	8 "	6 "	5.50	4 "
8 "	55 "	7 "	7 "	6 "	5.50	4 "

* Two projectiles are not to be fired from these guns at the same time, except at objects within 200 yards distance, and only when the advantages at the moment may be deemed by the captain sufficient to justify the risk of injuring the guns and their equipments by the extra strain to which they may be exposed.

Of the service charges one-tenth shall be for distant firing, six-tenths for ordinary firing, three-tenths for near firing, or for two projectiles. Saluting charges to be of under-proof powder.

The *calibre* and *class* of guns for which the cartridges are intended are to be distinctly marked near the top of the lid end of the tanks.

161. *Table of charges for navy rifle guns.*

Gun.	Ordnance.			Charge of powder.		
	Calibre.	Diameter of bore.	Weight.	Weight.	Kind.	Diameter of cartridge gauge.
	Pdr.	*In.*	*Lbs.*	*Lbs.*		
Parrott......	150	8.00	16,500	16	No. 7....	7.00 inch.
Do	100	6.40	9,700	10	No. 7....	5.50 "
Do	60	5.30	4,900	6	No. 7....	4.60 "
Do	30	4.20	3,550	3¼	Cannon..	3.70 "
Do	20	3.67	1,750	2	Cannon..	3.25 "
Dahlgren ...	20	4.00	1,340	2	Cannon..	....
Do	12	3.40	880	1	Cannon..	....

162. *Powder tanks.*

Capacity of tank for powder in grain.	Exterior dimensions.		Weight when empty.	Approxi'te weight when filled with cylinders.
	Height in inches, including lid and handle.	Sides, in inches.		
200 pounds.	22¼	16½ × 16½	67½ pounds.	218 pounds.
150 "	22⅛	15 × 15	59½ "	170 to 180 lbs.
100 "	20⅛	13 × 13		
50 "	16¾	10¼ × 10¼		

163. *Accommodation afforded by powder tanks of different sizes for cartridges of various kinds when closely packed.*

Capacity of tank for powder in grain.	WILL STOW CARTRIDGES AS FOLLOWS:																	WILL CONTAIN PRESSED CARTRIDGES IN THEIR ZINC CASES—			
Denomination.	*lbs.* 20	*lbs.* 16	*lbs.* 15	*lbs.* 12½	*lbs.* 10	*lbs.* 9	*lbs.* 8	*lbs.* 7	*lbs.* 6	*lbs.* 5	*lbs.* 4½	*lbs.* 4	*lbs.* 3½	*lbs.* 3	*lbs.* 2	*lbs.* $1\frac{75}{100}$	*lb.* 1	30-pdr., 3¼ lbs.	20-pdr., 2 lbs.	12-pdr., rifle, 1 lb.	12-pdr., smooth, 1 lb.
200 pounds	9	11	12	14	18	20	22	25	30	36	40	45	52	60	95	100	190	42	64	110	108
150 "	6	8	9	10	13	15	18	20	24	27	30	36	40	45	71	72	145	27	52	96	96
100 "	4	5	6	7	9	10	11	13	16	18	20	24	27	31	46	48	95	19	36	64	55
50 "	2	2	2	3	4	4	5	5	7	9	10	11	13	15	21	23	46	9	18	27	24
Powder barrel	4	6	7	8	10	11	12	14	16	....	....	26	....	35	52	55	108				

164. *Exterior dimensions of boxes containing pressed cartridges.*

		Long.	Wide.	High.
For 30-pounder	Containing 15 charges	22¾ inches.	× 14¼ inches.	× 7¾ inches.
30-pounder	Containing 16 charges	18¼ "	× 10¼ "	× 13¼ "
20-pounder	Containing 20 charges	20¼ "	× 9¼ "	× 11¾ "
20-pounder	Containing 24 charges	17 "	× 13¼ "	× 11 "
12-pounder, rifle	Containing 50 charges	17½ "	× 17½ "	× 10¼ "
12-pounder, smooth	Containing 50 charges	20 "	× 20 "	× 8¾ "

FIXED AMMUNITION FOR BOAT GUNS AND SMALL ARMS.

165. The charges for "*boat and field howitzers*" are—

	lbs.
For the 24-pdr. of 1,310 lbs.	2.00
For the medium 12-pdr. of 760 lbs.	1.00
For the light 12-pdr. of 430 lbs.	0.625

166. DIMENSIONS OF BOXES FOR BOAT AMMUNITION.

PROJECTILES WITH CHARGE OF POWDER FOR HOWITZER ATTACHED.

Calibre of boat howitzer.	Kind of projectile.	Number of projectiles box contains.	Dimensions of boxes, in inches.	Weight, in pounds.	
				Empty.	Filled.
24 pdr	Shrapnel	18	Double boxes.		
24 "	Canister	18			
12 "	Shrapnel	18			
12 "	Canister	18			
24 "	Shrapnel	9	22 × 20.75 by 13.75 high.	35⅛	270⅛
24 "	Canister	9	22 × 20.75 by 15.50 "	36⅛	217⅝
12 " heavy	Shrapnel	9	18.75 × 17.75 by 11.13 "	22⅞	140½
12 " "	Canister	9	18.75 × 17.75 by 12.25 "	25⅛	114⅞

167 DIMENSIONS OF SABOTS FOR SHELL.

	XV-in.	XIII-in.	XI-in.	X-in.	IX-in.	VIII in.	32-pdr.	24-pdr.	12-pdr.
	Inches	Inches	Inches.	Inches	Inches.	Inches.	Inches.	Inches.	Inches.
Thickness	5.	4.50	2.75	2.75	2.40	2.	1.50	1.90	1.50
Diameter { greatest	14.25	12.25	10.50	9.50	8.60	6.90	6.	5.70	4.60
Diameter { least	14.25	12.25	10.50	9.50	8.60	6.30	5.50	5.55	4.40
Depth of saucers	2.50	2.25	1.80	1.60	1.40	1.20	1.	1.50	1.30
	lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs.*				
Weights	8.90	5.50	2.70	2.40	1.85				

168. The cartridges for small arms are to contain the following quantities of powder:

For muskets	70 grains, Troy.
For muskets, (marine)	60 " "
For pistols	30 " "
For revolvers	18 " "

169. The ball cartridges for rifles and rifled muskets are to be made with a single Minie ball.

170 EXTERIOR DIMENSIONS AND CONTENTS OF BOXES

FOR SMALL-ARM AMMUNITION AND FIRE-WORKS.

Articles.	Exterior dimensions.			Each box contains—	Remarks.
	Length.	Width.	Depth.		
	Inches.	Inches.	Inches.		
Musket-ball cartridges	12½	8¼	8¼	500	
Do.... blank .... do	9⅛	7⅜	8⅛	500	
Carbine rifle-ball .. do	14⅛	8¼	7⅝	1,000	
Pistol-ball .... do	13⅝	6⅜	7¼	1,000	
Blue lights	20⅛	13	6⅞	30	
False-fires	20⅛	13	6⅞	30	
Port-fires	19⅜	10⅜	10¼	100	First size.
Do	19⅝	10⅛	6¼	50	Second size.
Signal rockets	15¼	9¼	8¼	30	
Percussion caps	11⅝	9¼	7⅝	6,300	

N. B.—There is a variation in the dimensions of the above boxes, as made, of ⅛ of an inch, on an average, in their exteriors.

171. Percussion caps and bullets for small arms will be supplied from the navy yard at Washington.

172. The boxes in which cartridges for small arms are packed for distribution to vessels are to be marked with the number they contain, and the kind of arm for which they are intended, and at the expiration of the cruise are to be carefully returned into store.

173. *Standard powder measures* for filling cartridges for great guns will be made at the navy yard, Washington, and distributed as they may be required for the use of vessels and shore magazines. As the gravimetric density of powder varies, the weight of the contents of measures should be ascertained for each lot, and allowance made accordingly before filling the cartridges.

CANNON PRIMERS.

174. These are of two kinds, *percussion* and *friction* primers. Each percussion primer is composed of a quill tube capped by an explosive wafer. The quills used for this purpose are first inspected by passing them through a gauge rather smaller than the vent.

The *tube* is filled with fine-grained powder.

The wafer is composed of a cap of cartridge paper, enclosing a layer of fulminate of mercury combined with a small quantity of mealed powder. When pressed and perfectly dry the wafer is coated with uncolored shellac to preserve it from dampness.

175. Primers are to be kept in *tin boxes* containing fifty each, the lids of which are luted with shellac to exclude moisture until wanted for immediate use. These boxes are intended to fit in and form a lining to the *primer-box*, fitted to slip on the *waist belts* worn by Captains of guns. For purposes of exercise no more of these boxes should be opened than are required; but for action a full box should be delivered to each Captain and 2d Captain of a gun.

176. *A friction primer* consists of a tube charged with gunpowder, to the top of which is fastened a spur containing friction powder, which is exploded by means of a slider pulled out by a laniard. It is intended for use in case the lock should be out of order, or the other primers fail from any unforeseen cause. Friction primers are packed in tin boxes in the same manner as percussion primers.

177. Filled boxes of primers are kept in close laboratory cases, for which stowage must be provided in the general storeroom of the ship, or other safe place.* They are "*on no account to be placed in the magazine*," and the boxes are to be so labelled before being put on board ship.

178. When *primers* have been returned from cruising ships, or have remained in store for one or more years, they are to be tested by firing five per cent. of the number, and the result reported, and are not to be issued again without special orders.

179. Damaged fuzes, primers, caps, and tubes, are always to be returned to the ordnance yard at Washington, in the condition in which they were received, on the return of the ship.

180. PERCUSSION CAPS for muskets, carbines, and pistols are made in the laboratory at the Washington navy yard. They are put up in small packages of water-proof paper, labelled with the number contained in the package and the date of the fabrication, and stowed in tin cases containing 350 caps each.

Laboratory boxes, in which these are packed, are of the following dimensions: 11¾ × 9¼ × 7⅜ inches, and will contain 6,300 percussion caps each. These boxes are to be labelled "*on no account to be put in the magazine.*" Stowage is provided for them in the general storeroom.

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* Primers and percussion caps should be divided into two or three equal lots, and stowed in different parts of the ship, that an accidental explosion should not deprive the ship of the means of firing cannon and small arms.

CARTRIDGE BAGS.

181. The material of which cartridge bags are made is woven expressly for the purpose and furnished by the Bureau of Ordnance as required. Color white with the calibre of the gun and the weight of the charge stencilled on the bag in figures two and a half (2½) inches long. When procured of necessity elsewhere the stuff should be chosen of wool, entirely free from any mixture of thread or cotton, and of sufficiently close texture to prevent the finer particles of powder from sifting through. Wildbore, rattinet, merino, and bombazette are named as proper materials for cartridge bags; of these the thinnest stuff, not twilled, but having the requisite strength and closeness of texture, is the best.

182. *Making cartridge bags.*—Cartridge bags for *cylindrical* chambers are to be made of a rectangle to form the cylinder, and a circular piece to form the bottom. The flat patterns, by which the cartridge bags for the 8-inch and 32-pounder guns are cut, are, consequently, to be made rectangular for the cylindrical part of the bag and circular for the bottom. The *length* of the rectangle is equal to the development of the cylinder, together with the allowance for seam, and its *width*, to the whole length of the bag, before sewing, including the allowance for seam and tie.

Special patterns are furnished for those of XV, XI, X, and IX inch shell guns.

183. DIMENSIONS OF FLAT PATTERNS FOR CUTTING OUT CARTRIDGE BAGS[*].

TO BE MADE OF PINE FOR THE 8-INCH AND 32-PDR. GUNS, AND OF METAL PLATES FOR THE "GOMER" CHAMBERS OF OTHER GUNS.[*]

Dimensions.	10-inch Shell-gun of 89 cwt.			64-pdr. Gun of 106 cwt.			32-pounder Gun and 8-inch Shell guns, having chambers of 32-pdr. calibre.								
Charges ....lbs.	10	9	8	16	12	8	10	9	8	7	6	5	4½	4	3
Width of rectangle, (length of bag cut,) including tie and four-tenths of an inch for seam. in	15.3	14.3	13.3	18.7	15.7	12.7	16.6	14.6	13.6	12.6	11.6	10.6	10.1	9.6	8.6
	inches.			inches.			inches.								
Length of rectangle, (cylinder developed,) including eight-tenths of an inch for seam.	19.05			22.8			18.1								
Radius of circular pattern of bottom, including four-tenths of an inch for seam.	3.50			3.40			2.95								
Diameters of cylindrical formers for inspection of cartridge bags.	6.00			7.00			5.50								

184. In cutting, the length of the rectangle should be taken in the direction of the length of the stuff, as it does not stretch in that direction, and the material should be chosen, as nearly as possible, of the width required for the length of the bags, to save waste in cutting.

The bags are to be sewed with worsted yarn, with not less than eight stitches to an inch; they are to be stitched within four-tenths of an inch of each edge, and the two edges of the seam *felled down* upon the same side, to prevent the powder from sifting through. The edges of the bottom are felled down upon the sides.

The bags, when filled, are to be tied with woollen thrums.

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[*] The dimensions of those for the XV, IX, X, and XI inch guns, which have "gomer" chambers, and cannot be conveniently tabulated, will be furnished to all vessels mounting such guns. The "formers" for inspection of bags will have the forms and dimensions of the "gomer" chambers less 0.87 inch for the IX-inch, 1.0 inch for the X-inch, and 1.15 inch for the XI-inch guns, for windage—in accordance with the flat patterns furnished for cutting.

185. *Cartridge bags for saluting charges.*—Old cartridge bags which have been condemned for service charges are to be repaired and used for saluting charges, and whenever it is necessary to make bags expressly for the purpose, or for immediate use, they may be formed by sewing together two rectangular pieces with semicircular ends.

186. *Inspection.*—The material especially procured for cartridge bags is to be carefully inspected to detect any mixture of cotton with the wool, by burning a few bits taken at hazard from each piece; or, by dissolving it in a solution of ½ ounce of caustic potassa in a pint of water—the cloth to be put in when the water is boiling, which is to continue until dissolution takes place. The texture of the stuff is also to be examined and its strength tried, such standard for the latter being established as may be found sufficient to insure perfect efficiency.

After being made up the empty bags are to be inspected, and those which are sewed with too long stitches, or in any other than the prescribed manner, are to be rejected. The dimensions of each bag are to be verified, first by laying it flattened out, between two marks on a table showing the width of a pattern bag. A variation of 0.1 inch greater or less is allowed. The bags are also to be tried on mandrels, or formers, made according to the dimensions given on the preceding page.

187. *Preservation from moths.*—Serge or any other woollen material employed for making cartridge bags is never to be exposed on the shelves in store, either in the piece or when made up. It is to be protected by packing with the hydraulic press, by sewing it up in linen cloth, or by enveloping it in water-proof paper, hermetically sealed.

An infusion of coloquintida, in the proportion of 15½ grains Troy to a quart of water, is said to be a good preservative against moths. In case of using this preparation the cartridge bags should be steeped in the infusion, and, after being *thoroughly* dried, may be packed by the hydraulic press, and headed up in old whiskey barrels, if stored on shore, or packed in empty tanks, if on board ship.

Cartridge bags, as well as the material for making them, are to be frequently examined to prevent their being damaged by *moisture*, as well as to guard against moths.

CHAPTER II.

MAGAZINES AND SHELL-ROOMS.

CONSTRUCTION, LIGHTING, STOWING, AND FLOODING.

188. No details of internal arrangement are to be more carefully considered and executed than those relating to the stowage and delivery of powder, since a defect in these particulars, apparently insignificant, may lead to the instantaneous destruction of the ship; or, with the incendiary and explosive projectiles now used, to her becoming, comparatively, an easy prey to an antagonist. Every possible precaution, therefore, is to be taken to accommodate the full allowance of powder completely; to guard it to the utmost against injury and accidental explosion; and to deliver it at the magazine, as required, with facility and certainty. To these ends, and in view of the fact that all the powder for great guns is now put up in cubical copper tanks, made water-tight, THE FORM OF MAGAZINES should be as nearly rectangular as the shape of the vessel will admit, and they should be built strong enough to resist sufficiently the effect of her working in heavy weather, and also the pressure of water they will have to sustain in case of being flooded.

189. All magazines should have a light-box for each alley at one end, and a passage to deliver powder at the other; and the magazine and its passage, considered as one, should be made perfectly water-tight by calking the bottom and sides, and then lining them internally, first with white pine boards, tongued and grooved, and again with sheets of lead of extra thickness, soldered together, over these boards. Both these linings are to extend entirely over the bottom or floor, and all the way up to the crown on all the sides.

190. When the magazine reaches the ceiling of the ship it should be battened off two inches; the lining of the floor should be battened up one, and also the magazine deck, so that water leaking through the sides of the vessel may run by and under and not into the magazine.

An external lining of sheet iron should also be resorted to to protect against fire, and to prevent the intrusion of rats.

191. A magazine aft in a ship is to have its passage for delivering powder adjoining its forward part, and one forward in a ship is to have this passage adjoining its after part, in order that it may not be necessary to pass the powder over the light-box scuttle.

192. As many doors are to be cut in the bulkhead separating this passage from the magazine room as there are alleys to be left in the latter, between the racks or shelves on which the tanks are stowed, and these doors are to correspond with those alleys. They are not only to afford a means of entrance to the magazine, but also for passing the tanks in and out. Through the upper part of each door a small scuttle is to be cut, (two, if necessary,) for the purpose of passing the cartridges out of the magazine room with the door itself closed; and it is to have a lid so arranged as to open outwards only, and to close of itself when the scuttle is not actually in use.

193. Sailing ships-of-the-line and frigates should have two alleys for each magazine. Propellers of large class, where the shaft will interfere with this arrangement, two alleys for the forward magazine. In smaller vessels one alley will suffice. In all cases the alley is to be *not less* than two feet and ten inches in breadth, and it ought to be more, if practicable, to prevent confusion and delay. Each alley is to be illuminated by a separate light.

If there be room in the magazine, there should be space left, at the end nearest the light, for a man to pass from one alley to the other without going into the passage.

194. Ships with two magazines—one forward and the other aft—are to have them as nearly equal, in point of capacity, as the shape of the vessel and other circumstances will admit.

Magazines should be kept as low down as possible. Their floors may rest on the keelson, but should not come below it. Their height should be equal, only, to an exact number of times the height of a powder tank when lying on its side, in addition to the thickness of the shelving. An additional half inch for each shelf should be allowed for play or spring. The whole height in the clear should be limited by the condition that a man standing on the floor may reach the upper tier of tanks with ease. Four tiers of 200-lb. tanks, three of them resting on shelves two inches thick, and the other on inch battens on the magazine floor, will, with an allowance of one and a half inch for play and spring, require a height, in the clear, of six feet two inches. This, both safety and convenience would suggest, should be the maximum limit in height, even for the largest magazine. Three tiers of these tanks will require a height, in the clear, of four feet seven inches.

If, however, in ships of great draft of water, it should be found practicable to extend the height of a magazine so as to accommodate five tiers of tanks, then the lower or ground tier may be laid so as to occupy the whole of the magazine floor, and on the top of this tier, in the alley-way, a light false bottom is to be placed for the men to stand upon to enable them to reach the upper tier, which is the one that should first be exhausted. This false bottom should be made of gratings and in sections convenient·for speedy removal.

195. When the state of things is such as to render it impossible to avoid extending the sides of the magazine so far out towards the skin of the ship as to leave only an air passage on either side, the crown should be *at least* six feet below the deep-load line.

In all cases where this crown is less than six feet below that line the sides should be made susceptible of protection by allowing a space to interpose materials, such as sand, coal, or water in tanks, between them and the inner planking of the ship.

An average space of six feet on both sides will probably be sufficient; still, if a greater space can be given, it ought to be. Under no circumstances, however well the sides be guarded, should the crown of the magazine, if it can be avoided, be less than four feet below the deep-load line.

196. It is proper to add, in connexion with this most important subject, that, in order to increase security against the effects of lightning, a magazine should be placed, if practicable, so as not to include a part of a mast.

197. All the metallic *fixtures* about a magazine, delivering passages and light rooms, are to be of copper.

198. Each delivering passage is to have, for the distribution of powder, at least as many passing scuttles communicating with the orlop or berth deck as there are chains of scuttles above. The powder boy will thus always find at the scuttle the proper passing box.

MAGAZINE COCKS.

199. Each magazine, as a whole—that is, including the delivering passage—being made, as stated above, water-tight, is to be provided with an independent cock for filling it rapidly with water; a waste pipe leading from above the upper tier of tanks to lead off the superfluous water; and a cock just at the floor for letting the water off when the magazine is to

be emptied after having been flooded. Both the cocks are to be turned from the deck above, each having a lever to its spindle for the purpose, distinctly marked, with engraved letters, what it is and how it is to be used, and kept secured by a proper lock, the key of which is to be kept among those of the magazines. A short pipe to lead the water down into the hold is to be attached to the emptying cock, and with this the waste pipe is to connect. All are to be well boxed over for protection against injury. A perforated disk, or strainer, is to be secured inside of the hole, at the upper part of the magazine, for the waste pipe.

LIGHTING THE MAGAZINE.

200. The magazine is to be lighted by means of one regulation lamp, to correspond with each alley of the magazine room, placed in a box arranged for the purpose. This box, of which a portion of the magazine bulkhead forms a part, is to be lined, internally, with soldered sheets of copper, and is to have a few inches of water in it whenever the lamp is lighted. The entrance to it is to be at the top, through a scuttle in the deck large enough to admit the lamp. For single-decked vessels this scuttle may be surrounded by a composition coaming pierced with holes one-fourth of an inch in diameter, on the forward and after sides near the top. The cover to be so arranged that, when placed in one position, all the holes will be closed—by turning it half round, they are all open; thus supplying air to the lamp and carrying off smoke. In the portion of the magazine bulkhead just alluded to, and so as to throw as much light as possible into the magazine room, an opening with grate bevelling is to be cut, which is to be covered by two plane glasses of suitable thickness, somewhat separated from each other, one of which, that next to the lamp, must be permanently fixed; and the other, or that next to the magazine, is to be let into a wooden frame so that it may be easily removed, and thus both glasses cleaned at any time with convenience and safety. The glasses are to be held in place by brass screws, after being closely fitted and having their edges made perfectly tight. A small dome or reversed funnel, of copper, where it can be conveniently done, is to be placed above the lamp and fitted with a pipe of the same metal to convey the smoke off. This pipe may pass up through the covering of the light-box, (which is to have a plug-hole, lined with brass, for the purpose,) and then led further, if necessary, taking care, however, to consult perfect safety throughout.

The admission of air to the light-box may be from the division of the hold in which it is placed, by small holes, near its top, through its side or back, protected with copper wire-gauze, inside and outside of the box.

The ceiling and bulkheads of all magazines and shell-rooms should be thoroughly whitewashed.

STOWING THE MAGAZINES.

201. In the stowage of magazines reference must be had to the Gunner's duties, (art. 36, Part I,) and to "Arrangements for delivering and distributing powder," (art. 180, Part I.) Ledges on the shelves or a bar of wood, to ship and unship with facility, will be provided for each tier of tanks, on each side of the alleys, to secure them from getting out of place when the ship rolls.

The Inspector of Ordnance will furnish the commander with an exact plan of the magazine and shell-rooms.

SHELL-ROOMS.

202. Rooms for the stowage of loaded shells require the same care in construction and protection against an enemy's shot, and in provision for lighting and flooding, as magazines. Therefore, they should always be built with reference to these objects, as well as to affording room enough to accommodate, conveniently, the number of loaded shells allowed, in their boxes, stowed in bulk. Each should have one light, arranged like those for magazines.

203. In vessels partially armed with shell-guns the best place, perhaps, for these rooms is immediately forward of the spirit-room, but not communicating with it; and in those armed entirely with such guns the additional shell-rooms necessary may be, perhaps, more conveniently placed abaft and adjoining the delivering passage of the forward magazine than elsewhere.

204. With the introduction of rifled cannon, and various special projectiles, it is essential to devote more care to the stowage of shells, to avoid confusion in battle. Not only each kind and calibre, but each length of fuze, is to be stowed in separate tiers.

DAMPNESS OF MAGAZINES AND SHELL-ROOMS.

205. Sponge dipped in a solution of salt water, and dried and weighed, is a means of ascertaining if dampness exists in these places. If it become heavier, the room is damp.

VENTILATION.

206. Provision must be made, by means of grating hatches, for sufficient ventilation in action, to supply the magazine men with fresh air, and allow the dampness caused by perspiration to pass off.

CHAPTER III.

GUN GEAR, IMPLEMENTS, AND EQUIPMENTS.

SELVAGEE WADS.

207. *Selvagee wads* are made by the wad machine at the navy yards. This consists of pairs of disks adapted to each calibre of guns, which being placed face to face on a spindle and keyed, present an annular score, grooved in such a way as to make, when filled, a grommet of the requisite size. Transverse notches are cut in the circumference of the disks to the bottom of the score, for the convenience of marling the wad before taking it off the mould.

In making the wad the end of a rope yarn is fixed in the score and the mould is turned by a crank until the score is filled. The grommet thus formed is marled like a selvagee strap, and a section of about an inch is taken out of it, in order to make the wad, when swelled by dampness, enter the bore of the gun readily.

Selvagee wads should be made neither too hard nor too soft, and to avoid either of these extremes a sufficient number of hitches only will be taken to give the wad the consistency required for service.

Sections of one-third or one-fourth of these wads will answer as well, in case of need.

GUN GEAR, IMPLEMENTS, AND EQUIPMENT.

208. Breechings for all guns are to be made of the best hemp, of three-stranded rope, shroud laid and soft, and for smooth bore guns not to measure less than seven and a half nor more than eight inches in the coil, excepting those for IX-inch guns, which are to measure nine and a half inches, and for XI-inch ten and a half.

209. The breeching bolts must never be of *less dimensions* than those prescribed by regulation, and there must be *double sets* for the IX and XI inch guns.

210. In fitting breechings a thimble is to be *spliced* into one end, the strands stuck through twice and marled down. A thimble is to be *turned into* the other end, so that the length of the breeching may be conveniently altered. Thus fitted, when the gun is run in and levelled, breechings must be long enough to allow the muzzle of the gun to come a foot inside of the upper port sill, if the breadth of the vessel will allow it. With guns of violent

recoil this distance may be advantageously doubled, where there is room enough, as thereby the strain will be much lessened.

Breechings are neither to be covered, nor blacked, nor rendered less pliable.

211. Gun-tackle falls will be made of Manilla or such other pliable rope as may be directed from time to time by the Bureau of Ordnance. It is prohibited to blacken them or to diminish their pliability. Three-inch rope will be found large enough for the heaviest, and from 2½ to 2¼ inch for the lighter, guns.

The rope being well stretched, the falls are to be cut of sufficient length to allow the full recoil, leaving end enough to hitch round the straps of their double blocks, when hooked to the middle bolts.

212. *Blocks* for gun tackles should have pins of hardened copper, turned smooth, and sheaves of lignumvitæ without bouching. Those to reeve 3-inch falls to be 10 inches, those for 2½-inch falls 9 inches, and those for 2¼ inch falls 8 inches long. The hooks of gun-tackle blocks are not to be less than one and a half inch diameter at the bend for heavy, and one and a quarter for light, broadside guns.

Metallic blocks with *nibs*, which keep the blocks fair with the falls, and thus prevent the falls from fouling in the recoil, are to be supplied to all Marsilly and heavy pivot carriages.

GRIOLET.

213. The GRIOLET PURCHASE for dismounting guns on covered decks is composed of—

A *toggle block*, made of elm or oak, the outer end or *head* of which is made rather larger in diameter than the inner one, which exactly fits the bore of the gun. The *head* has two sheaves in it, so as to form the lower block of the *muzzle purchase*, and is bound at the outer end with an iron band.

A double *cascabel block* of iron is made either with a shackle or to fit between the jaws of the cascabel, where it is secured by the cascabel pin. The iron pins on which the sheaves revolve are formed with eyes, for the convenience of hitching the standing part of the purchase.

Two *iron treble blocks*, one for the muzzle and the other for the breech purchase.

The *muzzle-purchase block* is so fitted as to be either shackled or toggled to the housing bolt above the port, and the *breech-purchase block* has an iron strap terminating above, with an eye by which it is shackled to a bolt passing through the deck above the gun. This bolt has an eye in one end, and a screw or key-slit at the other, and, when in place, is secured above the deck with a nut or key, between which and the deck a washer of hard wood or iron of suitable breadth and thickness is placed.

The hole through which this bolt is put should be directly above the cascabel block when the muzzle of the gun is under the housing bolt, and may be bored at the time the gun is to be dismounted; and stopped afterwards with a plug of wood coated with white lead.

But as it is desirable that every division on the gun deck should be exercised in mounting and dismounting its guns, a hole may be made in the deck above each division and bouched with a composition screw-tap.

The purchase falls should not be less than three and a half inches in size, and should be made of Manilla rope, of sufficient length to reeve full, the gun being supposed to be on deck and the upper blocks in place, allowing also sufficient end for splicing in the thimbles and hitching the standing part of the purchase when rove.

An iron thimble, large enough to hook the double block of a side or train-tackle, is spliced into the end of each purchase fall.

FIRE SCREENS,

214. Are made of thick fearnaught, or of double baize, with holes through which to pass the powder; these holes to be covered by broad flaps of the same material. One screen is to be hung abaft, and another forward of the magazine passing-hatch and scuttles, in sloops-of-war; in ships-of-the-line and frigates, one is usually to be hung abaft the fore, and one forward of the after, magazine scuttle; but as ships are differently arranged, two to each magazine will be allowed, if required.

215. Canvas chutes for returning empty passing boxes are to be supplied to each scuttle.

MAGAZINE DRESSES,

216. Are to be of worsted, like a simple shirt, to reach to the knees—no metal buttons to be worn.

The shoes are to be made wholly of *cotton canvas* or buckskin. In hot climates or warm weather generally, the *naked* feet are preferred. India-rubber and woollen slippers are prohibited.

RATTLES FOR CALLING BOARDERS,

217. To be made like those used by watchmen, of white oak, or some other similar wood. Rattle, 12 inches long; ratchet, 2 inches in diameter;

spring, one inch in width, and of sufficient thickness and elasticity to produce the requisite sound. Weight enough should be given to the butt to cause it to revolve round the handle with ease.

Fixed rattles of greater power will be attached to suitable places on each deck.

SHELL WHIPS,

218. To be made of two-inch rope, rove through two single blocks, one above the other, in the shell hatchway, and the ends knotted together. A hook is fixed on each part of the whip, near the block, so that the parts being bowsed on alternately, a full box is brought up on one hook, and an empty one lowered by the other, at the same time.

FLASH-PANS.

219. Shallow copper bowls, large enough to hold an ounce of powder, with a handle two feet long to be supplied to all vessels

DARK LANTERNS,

220. To be made of copper, tinned inside, with two handles at the side, that the shade may be turned without *taking hold of the top*. The whole height, 12 inches; diameter, 4 inches.

BOAT GRAPNELS,

221. Are made of round iron, quite light, for throwing into the rigging or chains of the enemy, for the purpose of holding on when boarding; their prongs are barbed.

Six feet of small chain are to be attached to the ring and connected with six fathoms of one and three quarter rope.

TARGETS.

222. In the construction of targets for practice at sea the chief object will be to give buoyancy and stability to the screen, with sufficient development of its surface. To these ends whiskey or beef barrels, supporting boards of sufficient length, will afford staging for the masts, yards, and screen; the heel of the mast passing through the stage and having ballast attached to it. The stage should be so fitted as to be readily put together, when wanted, and taken apart for stowage.

Harbor targets may be anchored, or supported on stakes; but it would conduce to good practice to stretch a screen of sufficient length to show, distinctly, four or six ports, with the proper intervals between. This will the better exhibit the lateral effect of the firing of each gun, and of the concentration of fire from several guns at known distances.

PACKING BOXES.

223. Cartridges for small arms, primers, spur-tubes, percussion caps, spare fuzes, false-fires, blue lights, port-fires, and signal rockets, will generally be supplied to vessels in boxes, in which they can be kept with little liability to injury, until wanted for use.

These boxes are to be safely kept and returned into store, or accounted for in the same manner as other articles of Ordnance stores, by those persons in whose charge they may be placed.

GUN SLINGS

224. Are to be made of chain of ¾-inch iron and tested to secure proper strength; the rings are to be of 1¼-inch iron. The length of the slings should exceed by one foot that of the longest gun on board. The two parts should be parcelled and marled together for a space of two feet before and one foot behind the trunnions of the longest gun, and a piece of three-inch rope spliced around both parts in the wake of the parcelling, long enough to take four or five turns round the chase of the largest gun.

TRUNNION SIGHT.

225. The *trunnion sight* is designed to be used only when the required elevation passes the limits of the other sights. It is formed of a bar of mahogany, or other hard wood not liable to warp, of about forty inches in length, two inches wide, and one inch thick, with a brass notch at the rear end and a point at the other, fixed in, and parallel to, the upper edge. It is attached, by a stout thumbscrew, to the axis of the left trunnion, around which it revolves when the screw is slack.

The face of the trunnion is graduated into degrees, so that the sight may be used with the tables showing the corresponding ranges of the several classes of guns with their distant firing-charge.

The upper edge of the sight-bar corresponds with 0° when the line of sight is parallel to the axis of the bore.

In using this sight the thumbscrew is first loosened and the sight directed at the object, in which position it is held until the desired elevation above it is given to the gun, when it is screwed fast again.

226. Long's trunnion sight, which has been supplied to several vessels for trial and report, is claimed to have some advantages over the common sight.

It consists of a pendulum so suspended as to indicate both the pitching and rolling motions, on a graduated arc, by means of an index or pointer.

Either of these instruments furnishes but a rude approximation in either elevation or direction.

Tangent sights placed on the side of the breech with a fixed front sight on the trunnion, as in rifled cannon, will hereafter be supplied, and give the sight with equal accuracy at all elevations.

RAMMERS.

227. *Rammer heads* are to be made of well-seasoned ash, birch, beech, or other tough wood, of the form and dimensions given in the drawings furnished by the Bureau to the different navy yards. The face of the rammer is hollowed, so as to embrace the front of the ball and press the selvagee wad home in its place. A hole is bored lengthwise *through* the head to admit the tenon, which is fastened by a pin of hard wood, three-tenths of an inch in diameter, passing transversely through the head and tenon. The diameter of the staff is 1.75 and that of the tenon 1.5 inch. The diameter of the rammer head will be 0.25 inch less than that of the bore or chamber to which it is adapted.

For all chambered guns the rammers will be adapted to the chamber, but, as above described, will answer equally well for the shot and selvagee wad.

Staves are made of tough ash, and are one foot longer than the bores of the guns for which they are intended: they are to have grooves $\frac{1}{16}$ of an inch deep and $\frac{1}{4}$ broad cut in them to show when the "ordinary charges" are in place, and, by due allowances, the others also.

For rifled cannon rammer heads are made of composition of the pattern prescribed by the Bureau.

228. *Sponge heads* are to be made of poplar, or other suitable light wood. A hole 1.5 inch in diameter is bored through the axis to admit the tenon of the staff, into which the worm is previously secured by means of a brass pin which passes through an eye in its shank and the tenon. The worm is intended to project half an inch beyond the face of the sponge head, when the tenon is in place, and to have free play back into its socket when pressed against the bottom of the bore. It must be two inches in length and one and a quarter inch in diameter, and be made of elastic brass or composition wire two-tenths of an inch in diameter, and tapering at the points, so as to preserve its elasticity and firmness. It is to be *left*-handed, in order to *act* when turned to the right, or with the sun.

The wood of which sponge heads are made should be well seasoned, and should be gotten out of a size but little greater than the diameter of the heads for which it is intended, so that there may be as little shrinkage as possible in the finished heads.

The heads, when finished, should also be primed with several coats of boiled linseed oil or varnish, as the porous wood of which they are made is apt to become water-soaked.

229. For chambered guns the sponges are to fit the chambers and slopes, and a portion of the main bore, as shown in the drawings furnished by the Bureau. When of wool the whole surface will be covered, and so sheared as to have no windage, and to be even with the points of the worm, that they may take effect. The heads for woollen sponges should be one inch less in diameter than the bores or chambers of the guns for which they are intended.

230. The heads for the sponges of unchambered guns are to be eight inches long; and all sponge heads intended to be covered with woollen material are to be slightly tapered, and secured by a thin copper hoop, fastened with copper tacks, on the inner end.

231. *For Bristle Sponges* the heads must be 1.5 inch less in diameter than the bores or chambers for which they are designed. The bristles are to be sheared so as to work easily and leave no windage. The worm must project one-fourth of an inch in order to take the bottom of the bore, and special care is to be taken by the Inspector that it has both the necessary stiffness to act efficiently and elastically enough, when pressed home, to yield sufficiently to allow the bristles to act also. Spiral spaces extending the whole length of the sponge head (including the portion adapted to the main bore in chambered guns) are to be left, in order to bring out the unconsumed portions of cartridges. These spaces are to be left-handed like the worm.

Great care is necessary in stowing them to prevent the bristles from being crushed down by contact with hard substances. For this purpose "fenders" will be provided with copper tacks, on the inner end.

232. Sponge staves are to be made of tough ash, 1.75 inch in diameter, and must be 18 inches longer than the bores of the guns for which they are intended.

233. *Sponge caps* are made of duck, and, except for spar-deck guns, when they are exposed to the weather, should not be painted, but they, as well as the staves, should be kept clean by scrubbing. A becket should be attached to the end to haul them off by.

Sponges should be washed carefully and dried after use before putting the caps on, and frequently examined and dried to prevent their rotting.

Bristle sponges, when not in use, should always be carefully protected from damage by contact with other articles.

ROBINSON'S WORM.

234. *This worm* consists of a screw, 1¼ inch in diameter, of two turns, at the end of a cylindrical iron shank, with a socket and straps riveted to the staff, which is 1.5 inch in diameter. The worm is supported in the axis of the bore by means of a guide ring of composition, kept in place on the shank, six inches from the end, by a shoulder and forelock.

Thus adjusted, it is used to draw the junk wad and cartridge; the latter being laid hold of by the tie, if the staff be held in the axis of the bore, is uninjured.

When the ring is removed the worm will be equally efficient in drawing the selvagee wad.

LADLES.

235. *Ladles*, when required, are to be made according to the patterns sent to each of the navy yards. Ladles which may be on hand are to be tried in drawing projectiles from the guns before they are issued for service.

SCRAPERS FOR BOTTOM OF BORE.

236. They consist of two steel blades, crossing each other in the middle, and having their edges conformed to the curve of the bottom of the bore. These are inserted in a sponge head, and are designed to remove the cake usually caused by the adherence of the bottoms of the cylinders to the bottom of the bore.

The edges of the scrapers are so bevelled as to act only when turned to the right, or with the sun.

237. Scrapers are also to be supplied for rifled cannon, made to clean a groove and the adjacent lands.

HANDSPIKES.

238. Handspikes are to be made of well-seasoned white hickory, of the form and dimensions directed by the Bureau. They are always to be shod, to be stained black, and oiled. The Ordnance Officer of the navy yard will ascertain that they ship freely in the training loops or sockets.

For IX-inch guns Lieutenant Beaumont's roller handspike has been adopted.

IMPRESSION TAKERS.

239. All vessels carrying XI and IX-inch guns or 150 and 100-pounder rifles are to be furnished with an impression taker and wax. Impressions of the vent are to be taken after every ten shotted rounds in practice, and at the close of an action.

PASSING-BOXES.

240. Passing-boxes are to be made of strong and well tanned harness or sole leather, strongly sewed, or of such other material as may be directed.

For 8-inch and 32-pounder guns they are to be of sufficient height to contain *two* "near firing" charges.

Their diameters, in the clear, are to be half an inch greater than those of the cartridges they are to contain.

Their tops are to be distinctly lettered, in letters one and a half inch long, with the calibre and class of gun they are intended to serve, and are to slide on the beckets.

241. All passing-boxes shall be painted black, with the *calibre* and *charge* painted in white letters two and one-half (2½) inches long on the side, and one and one-half (1½) on the top.

242. If, however, there are any guns of the same calibre on *spar decks* requiring lighter charges, the *lower half* of the box shall be painted *white*.

For *gun decks* in similar cases the lower half shall be painted *red*.

FIRE-TUBS.

243. Fire-tubs are to be made of oak, of the patterns furnished by the Bureau, the hoops being of iron. The top is to be provided with a stout hoop of wood, to ship and unship, with a grating across it of stout copper wire, the meshes of which are to be small enough to prevent the passing-boxes from falling into the water when struck over the tub.

FIRE-BUCKETS.

244. Fire-buckets are to be made of light well-tanned sole leather, according to pattern.

THE GROMMET MUZZLE LASHING FOR HOUSING GUNS,

245. Consists of a grommet made of rope double the size of the gun-tackle falls, with two cringles worked into it for the frapping lashing, which will be of stuff half the size of the tackle falls.

The grommet will be made large enough just to slip over the swell of the muzzle when the bight is over the housing hook bolt, and the gun is in position for housing. It will be wormed throughout, and parcelled in the wake of the housing bolt and frapping lashing, and when there is no swell, in the wake of the muzzle ring.

When the housing bolt is an eye-bolt the grommet is secured to it by means of a toggle which has a laniard.

FUZE WRENCHES.

246. For navy time fuze of steel, shank round, four inches long, four-tenths of an inch diameter. Prongs round, one and a half inch long, three-tenths of an inch diameter. Cross handle of wood, with small forked screw-driver in one end for water cap. The prongs of the wrench are flattened at the ends, and are one and a half inch apart.

A three-armed wrench is also required for the Parrott, Shenkle, and Hotchkiss fuzes, all of which differ.

RIGGING STOPPERS.

247. Standing rigging, when stranded or shot away, is most readily and effectually secured for the moment by using stoppers composed of two small dead-eyes, fitted with double selvagee tails and laniards, of sizes suitable to the rigging, whether lower or topmast. These are to be fitted on board ship, and are set up by means of pendant-tackles or of jiggers, as the case may require.

MAST BANDS.

248. Are to be made to suit the several lower masts and the bowsprits, and their respective fishes.

They are to be either hinged or in two pieces; in both cases to key together. The iron of which they are made to be $2 \times \frac{3}{16}$ inches. In use they are to be put on at intervals of two or three feet, and are to be wedged and filled in solidly.

Chain is however better and more portable, easier stowed away, &c.

HARNESS CASKS FOR BOATS.

249. For expeditions the launches and first cutters of all vessels are each to be provided with an iron-hooped harness cask, made light and of suitable size to contain, between them, a week's supply of pork for all the boat's crews of the ship, and adapted to the form of the boat and to convenient stowage.

ACCOUTREMENTS FOR CAPTAINS OF GUNS, BOARDERS, AND SMALL-ARM MEN.

250. WAIST BELTS, to be made of buff leather, two inches wide, and from forty to forty-four inches long; a standing loop and eyelet-holes at one end and brass hook riveted to the other.

The same belt is used by Captains of guns and boarders, as well as by small-arm men and the crews of field howitzers, the *frogs* and *boxes* to hold the arms and ammunition being fitted with loops to slip on and off the belt as circumstances require, and in the following order:

1st and 2d Captains of guns, and of field and boat howitzers, wear the primer box in front; if they are boarders the sword on the *left* and the *pistol* frog on the *right* hip. These equipments, consequently, will be slid on towards the loop end of the belt, in the order just named.

Other boarders and guns' crews of howitzers, when used as field guns, wear their arms, as in the preceding case, *without the primer box.*

Men armed with muskets, and acting on shore, will wear musket cartridge boxes, fitted with frog and scabbard for bayonet on the waist belt.

Men who may be armed with carbines on shore duty will wear cartridge boxes with waist belts. For boat duty, or *when armed with pistols and swords,* they will wear the waist belt with the proper frog and boxes.

251. Instead of the sword frog the sword scabbards of Admiral D. D. Porter's pattern, are fitted with a loop to slide on the waist belt. This scabbard also dispenses with the brass mountings, which are replaced by leather ones. The whole is fastened by copper rivets instead of being sewed.

252. PRIMER BOXES, of black bridle leather, rectangular in form, and of the size to contain, loosely, the tin *packing box.* Flap covering the top and front with a button-hole *strap* one inch in width, sewed near the bottom; *brass button* riveted to the bottom of the box. *Loop,* two inches wide, placed upright on the back of the box for the waist belt to pass through.

253. PISTOL FROG, (buff leather,) wide enough at the mouth to cover the cock of the pistol, and at the lower part to accommodate the stock; upper part of the back of it turned down to form a loop large enough to admit the waist belt. The stitches forming the side seams not to come nearer than 0.25 inch from the edges of the leather.

Pocket, (thin bridle leather,) *to contain three cartridges;* flap, tongue, and loop.

Cap pocket, like the cartridge pocket; *lining*, a strip of sheepskin with the wool on, glued with fish glue and sewed to the back at the mouth of the pocket.

These two pockets are of the same depth, and occupy the whole breadth of the pistol frog.

254. THUMBSTALLS, of buckskin, with hair-stuffed pad, and thongs for the wrist.

255. MUSKET CARTRIDGE BOX, (black bridle leather,) length, 7.2 inches; width, 1.6 inch; depth in front, 5.8 inches; inner cover, (upper leather,) 4 inches wide, with end pieces sewed to it so as to cover the ends of the box; flap, (harness leather,) 8.5 inches wide at the bottom, 8 inches at top, stamped U. S. N. in an oval on the outside; a button-hole strap, sewed near the bottom; brass button riveted to the bottom of the box; loop, (bridle leather,) with a hole in the middle to hook the shoulder belt to, sewed to the back of the box for the waist belt to pass through.

Cap pocket (light upper leather) sewed to the front of the box; length, 4½; depth, 2½ inches; flap, tongue, and loop (bridle leather;) *lining*, a strip of sheepskin with the wool on, 1.5 inch wide, glued with fish glue and sewed at the mouth of the pocket; *pocket* for *ballscrew* and *wiper* sewed on the right, and for *conekey* and *conepick* on the left of the cap pocket.

Two tin linings, each with a *lower division*, 3 inches by 3.3 inches, open in front, to contain a bundle of ten cartridges, and two bundles of caps containing 25 each, packed in water-proof paper. Each tin has also *two upper divisions*, 2.7 inches deep—one of 2 inches by 1.35 inch square, for six cartridges; the other, 1.35 inch square, for four cartridges. The edges of the tins are turned over and soldered down to prevent them from cutting the fingers.

All the tin linings should be made to slide freely in the boxes.

256. CARBINE CARTRIDGE BOX.—The leather parts are like those of the musket cartridge box; length, 6.4 inches; depth in front, 3.7 inches; width, 1.3 inch; *inner cover*, 3.5 inches wide; *flap*, 6.6 inches wide at top, 6.8 at bottom, 6 deep. Tin linings; two lower divisions, 2 inches deep, 2.9 inches long, 1.2 wide; five upper divisions, 1.2 inch wide by 1.15 inch long, and 1.5 inch deep, to contain forty cartridges, those below in bundles of water-proof paper.

257. CONEPICK, (steel wire, No. 18,) 1.5 inch long, with a ring handle 0.5 inch in diameter; it is carried, with the conekey, in the pocket in front of the musket cartridge box.

258. **BAYONET SCABBARD**, (black bridle leather,) length, 19.3 inches. Frog (buff leather) sewed to a socket of black leather, which is fastened to the top of the scabbard; the loop of the frog to be made wide enough to slide on the waist belt.

PRESERVATION OF SMALL ARMS.

259. The Captain will take care that the Small Arms are carefully cleaned and wiped dry after every exercise or use of them, before they are put away.

260. He will cause them to be frequently examined at other times, to prevent their being clogged with oil or lacquer, and to be sure that they are always ready for use.

He will strictly prohibit their being marked or otherwise defaced.

261. It is directed that the men who use them be taught to clean them properly, and to remedy any slight defects or obstructions to their use.

Chests *not lined* preserve them best, if there be no proper armory.

DIRECTIONS FOR CLEANING ARMS.

262. In taking apart and cleaning guns there are required a screwdriver, wiper, wire-tumbler punch, and a spring vice. No other implements should be used in taking arms apart, or in setting them up.

263. *Dismounting and cleaning.*—The rifle-musket should be dismounted in the following order, viz:

1st. Unfix the bayonet. 2d. Insert the tompion. 3d. Draw the ramrod. 4th. Turn out the tang-screw. 5th. Take off the lock; to do this, put the hammer at half-cock, and partially unscrew the side screws; then, with a slight tap on the head of each screw with a wooden instrument, loosen the lock from its bed in the stock; turn out the side screws, and remove the lock with the left hand. 6th. Remove the side screws without disturbing the washers. 7th. Take off the bands in order, commencing with the uppermost. 8th. Take out the barrel; in doing this, turn the musket horizontally, with the barrel downward, holding it loosely, with the left hand below the rear-sight and the right hand grasping the stock by the handle; tap the muzzle on the ground, if necessary, to loosen the breech. If an attempt were made to pull the barrel out by the muzzle, it would, in case it were wood-bound, be liable to split at the head of the stock.

The foregoing parts of the rifle-musket are all that should usually be taken off or dismounted.

The breech-screw should be taken out only by an armorer, and never in ordinary cleaning. The mountings, cone, and cone-seat screw should not be taken off, nor should the lock be taken apart, except by permission of an officer.

264. *To clean the barrel.*—1st. Stop the vent with a peg of soft wood, or piece of rag or soft leather pressed down by the hammer; pour a gill of water (warm, if it can be had) into the muzzle; let it stand a short time to soften the deposit powder; put a plug of soft wood into the muzzle, and shake the water up and down the barrel; pour it out, and repeat the washing until the water comes out clear; remove the peg from the cone, and stand the barrel muzzle downward, to drain, for a few moments.

2d. Screw the wiper on the end of the ramrod, and put a piece of dry cloth or tow round it sufficient to prevent it from chafing the grooves of the barrel; wipe the barrel dry, changing the cloth two or three times.

3d. Put no oil into the vent, as it will clog the passage and cause the first cap to miss fire; but, with a slightly oiled rag on the wiper, rub the bore of the barrel and the face of the breech-screw, and immediately insert the tompion into the muzzle.

4th. To clean the exterior of the barrel, lay it flat on a bench or board to avoid bending it. The practice of supporting the barrel at each end, and rubbing it with a strap, buffstick, ramrod, or any other instrument, to burnish it, is pernicious, and should be strictly forbidden.

5th. After firing, the barrel should always be washed as soon as practicable; when the water comes off clear, wipe the barrel dry and pass into it an oiled rag. Fine flour of emery cloth is the best article to clean the exterior of the barrel.

265. *To clean the lock.*—Wipe every part with a moist rag, and then a dry one; if any part of the interior shows rust, put a drop of oil on the point or end of a piece of soft wood dipped into flour of emery; rub out the rust and wipe the surface dry; then rub every part with a slightly oiled rag.

266. *To clean the mountings.*—For iron and steel parts, use fine emery moistened with oil or emery cloth. For brass parts, use rotten-stone moistened with vinegar or water, applied with a rag, brush, or stick; oil or grease should be avoided. The dirt may be removed from the screw holes by screwing a piece of soft wood into them. Wipe all parts with a linen rag, and leave the parts slightly oiled.

267. *Dismounting by an armorer.*—The parts which are specially as-

signed to be dismounted by an experienced armorer will be stated in their regular order, following No. 8, viz:

9th. Unscrew cone. 10th. Take out cone-seat screw. 11th. Take out band springs, using a wire punch. 12th. Take out the guard screws. Be careful that the screwdriver does not slip and mar the stock. 13th. Remove the guard without injuring the wood at either end of the plate. 14th. Remove the side screw washers with a drift-punch. 15th. Remove the butt plate. 16th. Remove the rear-sight. 17th. Turn out the breech-screw by means of a "breech-screw wrench" suited to the tenon of the screw. No other wrench should ever be used for this purpose, and the barrel should be held in clamps, neatly fitting the breech.

268. *Lock.*—To take the lock apart: 1st. Cock the piece and apply the spring-piece to the mainspring; give the thumb-screw a turn sufficient to liberate the spring from the swivel and mainspring notch; remove the spring. 2d. The sear-spring screw. 3d. The sear-screw and sear. 4th. The bridle-screw and bridle. 5th. The tumbler-screw. 6th. The tumbler. This is driven out with a punch inserted in the screw hole, which at the same time liberates the hammer. 7th. Detach the mainspring swivel from the tumbler with a drift-punch. 8th. Take out the feed-finger and spring. 9th. The catch-spring and screw.

269. As a general rule, all parts of the musket are assembled in the inverse order in which they are dismounted. Before replacing screws, oil them slightly with good sperm oil (inferior oil is converted into a gum which clogs the operation of the parts.) Screws should not be turned in so hard as to make the parts bind. When a lock has, from any cause, become gummed with oil and dirt, it may be cleaned by boiling in soap-suds, or in pearlash or soda water; heat should never be applied in any other way.

270. *Precautions in using.*—In ordering arms on parade, let the butt be brought gently to the ground, especially if the ground be hard. This will save the mechanism of the lock from shocks, which are very injurious to it, and which tend to loosen and mar the screws and split the wood-work.

The ramrod should not be "sprung" with unnecessary force, for fear of injuring the corners of the grooves, and, in stacking arms, care should be taken not to injure the bayonets by forcibly straining the edges against each other.

No cutting, marking, or scraping the wood or iron should be allowed, and no part of the gun should be touched with a file. Take every possible care to prevent water from getting between the lock, or barrel and stock.

If any should get there, dismount the gun as soon as possible, clean and oil the parts as directed, and see that they are perfectly dry before assembling them.

PAINTS, LACQUERS, ETC.

COMPOSITION AND PREPARATION.

271. The proportions are given for 100 parts by weight of prepared colors, &c., when not otherwise designated.

A gallon of Linseed oil weighs	7.5 lbs.
Spirits of turpentine	7.25 "
Japan varnish	7. "
Sperm oil	7.12 "
Neatsfoot oil	7.63 "

PAINTS AND LACQUERS.

Boiled oil.

Raw linseed	103.0 lbs.
Copperas	3.15 "
Litharge	6.3 "

Dryings.

Mixture of copperas and litharge taken from the boiled oil	60.0 lbs.
Spirits turpentine	56.0 "
Boiled oil	2.0 "

Putty, (for filling cracks in wood.)

Spanish whiting, pulverized	81.6 lbs.
Boiled oil	20.4 "

Another kind of putty, for the same purpose, is made by mixing fine sifted oak sawdust with linseed oil which has been boiled till glutinous.

White paint.

	PROPORTIONS.	
	For inside work.	For outside work.
White lead, ground in oil	80 lbs.	80 lbs.
Boiled oil	14.5 "	9 "
Raw oil	0 "	9 "
Spirits turpentine	8 "	4 "

Grind the white lead in the oil and add the spirits of turpentine.

New wood-work requires about 1 lb. to the square yard for three coats.

Lead color.

White lead, ground in oil	75.	lbs.
Lampblack	1.	“
Boiled linseed oil	23.	“
Litharge	0.5	“
Japan varnish	0.5	“
Spirits turpentine	2.5	“

The lampblack and litharge are ground separately upon the stone, in oil, then stirred into the white lead and oil; the turpentine and varnish are added as the paint is required for use, or when it is packed in kegs for transportation.

Black paint.

Lampblack	28	lbs.
Litharge	1	“
Japan varnish	1	“
Linseed oil, boiled	73	“
Spirits turpentine	1	“

Grind the lampblack in oil; mix it with the oil, then grind the litharge in oil and add it, stirring it well into the mixture. The varnish and turpentine are added last

This paint is used for the iron-work of carriages.

Paint for tarpaulins.

A square yard takes 2 lbs. for three coats.

1. *Olive.*—	Liquid olive color	100	lbs.
	Beeswax	6	“
	Spirits turpentine	6	“

Dissolve the beeswax in the spirits of turpentine, with a gentle heat, and mix the paint warm.

2. Add 12 ounces of beeswax to a gallon of linseed oil, and boil it two hours; prime the cloth with this mixture, and use the same in place of *boiled oil* for mixing the paint. Give two coats of paint.

Lacquers for iron ordnance.

1.	Black lead, pulverized	12	lbs.
	Red lead	12	“

Litharge	5 lbs.
Lampblack	5 "
Linseed oil	66 "

Boil it gently about twenty minutes, during which time it must be constantly stirred.

2. Umber, ground	3.75 lbs
Gum shellac, pulverized	3.75 "
Ivory black	3.75 "
Litharge	3.75 "
Linseed oil	78. "
Spirits turpentine	7.25 "

The oil must be first boiled half an hour. The mixture is then boiled 24 hours, poured off from the sediment, put in jugs and corked.

3. Coal tar, (of good quality)	2 galls.
Spirits turpentine	1 pint.

The turpentine to be added in small quantities during the application of the lacquer.

4. Anti-corrosion	40 lbs.
Grant's black, ground in oil	4 lbs.
Red lead, as a dryer	3 lbs.
Linseed oil	4 galls.
Spirits turpentine	1 pint.

This mixture, when well stirred and incorporated, will be fit for use; but, as by long keeping in this state it becomes hard, no more should be mixed than may be required for immediate use. It is used in the British service.

Anti-corrosion.—	Slag from iron foundries, pounded	12 lbs.
	Chalk	12 "
	Soot, common	1 lb.

In applying lacquer the surface of the iron must be first cleaned with a scraper and a wire brush, if necessary, and the lacquer applied hot, in two thin coats, with a paint brush. It is best done in summer.

Old lacquer should be removed with a scraper, or by scouring, and not by heating the guns or balls, by which the metal is injured.

A. PLANTOU'S COMPOSITION FOR COATING IRON OR WOOD AS A PRESERVATIVE.

First composition.

Pulverized rosin	3 lbs.
Pulverized shellac	2 oz.
Pulverized charcoal, or cannel coal	1 lb.
Spirits turpentine	1 oz.

Second composition.

Pulverized rosin	3 lbs.
Beeswax	4 oz.
Pulverized charcoal, or cannel coal	1 lb.
Spirits turpentine	1 oz.

The first two articles are to be dissolved in an iron vessel over the fire; the charcoal is then added and briskly stirred until the whole is well intermixed; after which the turpentine is added and stirred until it is well incorporated with the other ingredients. *Not safely made on board ship!*

The composition is to be applied when hot with a brush or spatula, and smoothed over with a hot iron. The wood or iron should be perfectly dry, and freed from rust or other loose substances.

Lacquer for small arms, or for water-proof paper.

Beeswax	13 lbs.
Spirits turpentine	13 galls
Boiled linseed oil	1 gall.

All the ingredients should be pure and of the best quality. Heat them together in a copper or earthen vessel, over a gentle fire, in a water bath until they are well mixed.

Lacquer for bright iron work.

Linseed oil, boiled	80.5 lbs.
Litharge	5.5 "
White lead, ground in oil	11.25 "
Rosin, pulverized	2.75 "

Add the litharge to the oil, let it simmer over a slow fire three hours; strain it, and add the rosin and white lead; keep it gently warmed and stir it until the rosin is dissolved. Apply it with a paint brush.

Varnish for scabbards, &c., or patent leather.

For 1st and 2d coats.—

Prussian blue, in lumps	4 lbs.
Sugar of lead	0.7 "
Aquafortis	0.7 "
Linseed oil, boiled	70 "
Spirits turpentine	24.6 "

The ingredients, except the turpentine, are boiled together, in an *iron* kettle, eight hours, when the mixture will assume a brilliant black color. When the varnish is nearly cool stir in the turpentine. The kettle in which the varnish is made should be of a capacity to hold double the quantity of varnish to be boiled. *Cannot be safely made on board ship!*

For the third or finishing coat.—COPAL VARNISH.

Gum copal, (in clear lumps)	26.5 lbs.
Boiled linseed oil	42.5 "
Spirits turpentine	31 "

This varnish is made in a *copper* vessel, smallest at the top, in the form of a still.

Put the copal in the vessel, set it on a charcoal fire for one hour, in which time it will melt, and all the watery particles will evaporate. Add the oil whilst the copal is warm, but not boiling hot. When nearly cool add the turpentine, which will give it a proper consistency for use.

For 5 lbs. copal, and the proper proportions of oil and turpentine, the vessel should hold six gallons. *Not safely made on board ship!*

Japan varnish.

Litharge	4 lbs.
Boiled oil	87 "
Spirits turpentine	2 "
Red lead	6 "
Umber	1 lb.
Gum shellac	8 lbs.
Sugar of lead	2 "
White vitriol	1 lb.

Japan varnish is generally purchased from the paint sellers. It is made by boiling on a slow charcoal fire for five hours all the ingredients except the turpentine and a small portion of the oil. The latter is added as required to check the ebullition and to allay the froth which rises to the surface. It must be continually stirred with a wooden spatula, and *great care is necessary to prevent it from taking fire*, and therefore *it cannot be safely made on board ship!*

The turpentine is added after the varnish is nearly cool, and is stirred well in. The varnish must be kept in tin cans closely corked.

Olive paste.

Yellow ochre, pulverized	68	lbs.
Lampblack	1.1	"
Boiled oil	37	"
Spirits turpentine	0.4	"

Make a thick paste with the ochre and oil in a paint pot, and with the lampblack and oil in another. Grind them together in small portions, and keep the mixture in a tin vessel.

Liquid olive color.

Olive paste	61.5	lbs.
Boiled oil	29.5	"
Spirits turpentine	5.5	"
Dryings	3.5	"
Japan varnish	2	"

Stirred together in a paint pot.

Brainard's paint.

Dissolve 10 pounds of shellac in 10 gallons of boiling water, adding 30 ounces of salæratus. Mix this solution with an equal quantity of paint prepared in the usual manner. This paint is economical and durable.

Black stain, (for wood-work of gun carriages.)

Copperas	1	lb.
Nutgalls	1	"
Sal ammoniac	¼	"
Vinegar	1	gal.

Stir it occasionally for a few hours and it will be ready for use.

The wood to be clean and smooth, and cracks filled with black putty, which must be allowed to dry. The stain to be applied two or three times and left to dry for a day or two. Then it is to be rubbed with boiled oil until sufficiently polished. Until the oil is applied the color will be bluish. This method of staining and preserving gun carriages has been tried successfully, and possesses the advantages of being cheaper than paint and of greater durability, and dispenses with the inconvenience of the frequent application of that implement erroneously termed a "*dry brush.*"

Impression wax for vents.

Beeswax	4 parts.
Tallow	2 "
Charcoal (finely powdered)	1 "

Melt the beeswax and tallow and stir in the charcoal.

Paper parchment, (used in the French navy for cartridges for all guns.)

Immerse unsized paper for a few seconds in sulphuric acid, diluted with half its volume of water, (at about 60°;) wash it well in cold water, then immerse it in a weak solution of caustic ammonia, and again wash.

It absorbs water and becomes soft and pliable like animal parchment, but is water proof. Is not affected by boiling water and indestructible by most acids; is not diminished in strength by wetting. It has about ⅔ the strength of animal parchment when dry; the thinner kinds make capital tracing paper—takes ink readily.

Cement for the above.

Cheese (fresh, without salt, if possible)	3 parts.
Quicklime	1 part.

Wash the cheese thoroughly three or four four times in boiling water, and grind the materials on a stone and muller, adding cold water until it is of the consistency of honey.

APPENDIX.

A. FORMS OF QUARTER BILLS.

B. TABLES OF GUNNERY PRACTICE.

C. FORMS OF REPORTS OF INSPECTION AND OF TARGET PRACTICE.

D. TABLES OF ALLOWANCES.

APPENDIX A

QUARTER BILLS OF UNITED STATES NAVY.

The following Quarter Bills for the more prominent classes of sailing and steam vessels in the United States Navy, and the Skeleton Watch Bills upon which they are based, are made agreeably to the Tables of Allowances issued July 20th, 1854, as modified by the General Order of the Navy Department of April 8, 1857. The mode of distributing the men observed in these Bills is recommended.

The same principle of quartering a ship's company may be applied to such other vessels as have been or may be added to the Navy, but are not numerous enough to form a class, and also to Quarter Bills of vessels provisionally armed. The table in article 78 of the foregoing instructions gives, under the calibre and class of guns, the number of men required to work them respectively,

The Powder division should be manned according to the principles laid down in articles from 180 to 201 of Part I, inclusive.

The Master's division is to be filled according to the size and rig of the vessel, taking care, in steamers which may be deficient in room to berth as large a crew as might be desirable, to fill only the indispensable stations in the Master's division, leaving the duties of Bracemen and Riggers to be performed, as circumstances may require, by Sailtrimmers from the guns. The stations and duties of Officers at Quarters will be established in conformity with the instructions in Chapter II, Part I.

SKELETON WATCH BILL

FOR A SHIP OF 84 GUNS.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Petty Officers to keep watch.	Petty Officers, idlers.	Bandsmen, idlers.	Total.
Forecastlemen	4	2	32	38	12	....	....	....	....	88
Foremastmen	....	....	4	4	....	....	....	....	....	8
Foretopmen	2	2	28	30	4	10	....	....	....	76
Mainmastmen	....	....	4	4	....	....	....	....	....	8
Maintopmen	4	2	26	38	4	10	....	....	....	84
Mizenmastmen	....	....	2	2	....	....	....	....	....	4
Mizentopmen	2	2	16	24	4	12	....	....	....	60
After Guard	2	2	12	40	98	12	....	....	....	166
Waisters	....	....	18	30	87	4	....	....	....	139
Messengers and Side-boys	....	....	....	....	....	16	....	....	....	16
Bandsmen	....	....	....	....	....	....	....	....	11	11
Petty Officers	....	....	....	....	....	....	47	14	....	61
Total of each Grade	14	10	142	210	209	64	47	14	11	721

QUARTER BILL FOR A SHIP OF THE LINE OF 84 GUNS, WITH A COMPLE

QUARTER DECK.—Captain; Commander, or other Executive
2 Midshipmen, as Aids;

Decks.	No. of gun.	Number of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLE-MEN.				FORETOPMEN.					MAINTOPMEN.				
					Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Boys.	Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Boys.
LOWER.	1	14 & boy.	S	Q M.		1	1	1			1		1			1		
	2	"	P		C F.	1	1	1			1		1			1		
	3	"	S			1	1	1	Capt.		1		1			1		
	4	"	P	B M.		1	1	1			1		1			1		
	5	"	S			1	1	1			1			Capt.		1		1
	6	"	P	Q M.		1	1	1			1					1		1
	*7	16 & boy.	S		Cox.	1	1				1				1	1	1	1
	*8	"	P			1	1		Cox.		1				1	1	1	1
	*9	"	S	B M.		1	1			1	1				1	1		
	*10	"	P			1	1			1	1			Capt.	1	1		
	*11	"	S	Q M.		1	1			1					1	1		
	12	14 & boy.	P			1	1			1					1	1		
	13	"	S	Q M.		1	1			1					1	1		
	14	"	P			1	1			1				Cox.	1	1		
	15	"	S			1	1			1					1	1		
	16	"	P			1	1			1					1	1		
MAIN.	1	12 & boy.	S			1	1	1		1	1		1	Cox.		1		
	2	"	P	B M.		1	1	1		1	1		1			1		
	3	"	S		C F.	1	1	1		1	1		1			1		
	4	"	P			1	1	1	Capt.	1	1		1			1		
	5	"	S			1	1	1		1	1			Capt.		1		1
	6	"	P		Cox.	1	1	1		1	1					1		1
	*7	14 & boy.	S	B M.		1	1			1	1				1	1	1	1
	*8	"	P	Q M.		1	1			1	1				1	1	1	1
	*9	"	S			1	1		Cox.	1	1				1	1		
	*10	"	P			1	1			1	1			Capt.	1	1		
	*11	"	S			1	1			1					1	1		
	12	12 & boy.	P	Q M.		1	1			1					1	1		
	13	"	S			1	1			1					1	1		
	14	"	P	B M.		1	1			1					1	1		
	15	"	S			1	1			1					1	1		
	16	"	P				1									1		
SPAR.	1	12 & boy.	S		C F.		1			1	1	1	1			1		
	2	8 & boy.	P				1			1	1	1	1			1		
	3	"	S				1				1	1			1			1
	4	"	P				1				1	1			1			1
	5	"	S				1				1							
	6	"	P				1				1							
	7	"	S								1					1		
	8	"	P								1				1	1		
	9	"	S													1		
	10	"	P							1	1					1		

* Shell guns.

MENT OF 721 MEN AND BOYS, EXCLUSIVE OF OFFICERS AND MARINES.

Officer; Master; Passed Midshipman, as Signal Officer; and Captain's Clerk.

MIZENTOPMEN.					AFTER GUARD.				WAISTERS.				
Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Boys.	Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Seamen.	Ord. Seamen.	Landsmen.	Messenger boys.	Officers of divisions.
....	1	....	....	....	....	1	1	2	....	1	2	....	***1st Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
....	1	....	....	....	....	1	1	3	....	1	1	....	
....	1	....	....	....	....	1	1	3	....	1	1	....	
....	1	....	....	....	....	1	1	2	....	1	2	....	
....	1	....	....	....	....	1	1	3	....	1	1	....	
....	1	....	....	....	....	1	1	2	....	1	2	....	
....	1	....	....	....	....	....	1	3	....	1	3	....	***2d Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
....	1	....	....	....	....	....	1	4	....	1	2	....	
....	....	....	1	1	....	....	1	3	....	1	3	....	
....	....	....	1	1	....	....	1	4	....	1	2	....	
....	....	1	1	1	....	....	1	3	....	1	3	....	
Capt.	....	1	1	1	....	....	1	2	....	1	2	....	***3d Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
....	....	1	....	1	....	....	1	2	....	1	3	....	
....	....	1	....	1	....	....	1	4	....	1	1	....	
Cox.	....	1	....	....	....	....	1	3	....	1	2	1	
....	....	1	....	....	Cox.	....	1	3	....	1	2	1	
....	....	....	....	....	....	....	1	2	1	....	1	....	***4th Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
....	....	....	....	....	....	....	1	2	1	....	1	....	
....	....	....	....	....	....	....	1	2	1	....	1	....	
....	....	....	....	....	....	....	1	2	1	....	1	....	
....	....	....	....	....	....	....	1	2	1	....	1	....	
....	....	....	....	....	....	....	1	2	1	....	1	....	
....	....	....	....	....	....	....	1	3	....	....	2	....	***5th Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
....	....	....	....	....	....	....	1	3	....	....	2	....	
....	....	1	....	....	....	....	....	4	....	....	2	1	
....	....	1	....	....	....	....	....	4	....	....	2	1	
....	....	1	....	....	Cox.	....	1	4	....	....	2	1	
....	....	1	....	....	....	....	1	3	....	....	1	1	***6th Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
Capt.	....	1	....	....	....	....	1	3	....	....	1	1	
....	....	1	....	....	....	....	1	3	....	....	1	1	
....	....	1	....	....	Capt.	....	1	2	....	....	2	1	
Cox.	....	1	....	....	....	1	1	3	....	2	1	1	
....	....	1	....	....	....	....	1	2	....	1	1	....	***7th Division.*** Lieut. or P. Mid'n. Midshipman. 1 Quarter Gunner.
....	1	1	....	....	....	....	1	....	....	....	....	....	
....	1	1	....	....	....	....	1	....	....	1	....	....	
....	1	1	....	....	....	....	1	....	....	1	....	....	
....	1	1	....	....	....	1	1	1	....	1	....	1	
....	1	1	....	....	....	....	1	1	1	1	....	1	***8th Division.*** Passed Midshipman. Midshipman. 1 Quarter Gunner.
....	1	1	....	....	....	....	....	1	1	2	....	1	
....	.	1	....	....	....	1	....	1	....	2	....	1	
....		1	....	....	....	1	1	1	1	2	..	1	
....	....	1	....	....	....	1	1	1	....	1	....	1	

QUARTER BILL FOR A SHIP OF THE LINE OF 84 GUNS, WITH A COMPLE

QUARTER DECK.—Captain; Commander, or other Executive
2 Midshipmen, as Aids;

Decks.	No. of gun.	Number of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.					MAINTOPMEN.				
					Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Boys.	Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Boys.
LOWER.	1	14 & boy.	S	Q M.	......	1	1	1	......	..	1	..	1	......	..	1	..	..
	2	"	P	......	C F.	1	1	1	......	..	1	..	1	......	..	1	..	..
	3	"	S	......	......	1	1	1	Capt.	..	1	..	1	......	..	1	..	..
	4	"	P	B M.	......	1	1	1	......	..	1	..	1	......	..	1	..	..
	5	"	S	......	......	1	1	1	......	..	1	..	..	Capt.	..	1	..	1
	6	"	P	Q M.	......	1	1	1	......	..	1	..	..	......	..	1	..	1
	*7	16 & boy.	S	......	Cox.	1	1	..	......	..	1	..	..	......	1	1	1	1
	*8	"	P	......	......	1	1	..	Cox.	..	1	..	..	......	1	1	1	1
	*9	"	S	B M.	......	1	1	..	......	1	1	..	..	......	1	1	..	..
	*10	"	P	......	......	1	1	..	......	1	1	..	..	Capt.	1	1	..	..
	*11	"	S	Q M.	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	12	14 & boy.	P	......	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	13	"	S	Q M.	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	14	"	P	......	......	1	1	..	......	1	..	..	..	Cox.	1	1	..	..
	15	"	S	......	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	16	"	P	......	......	1	1	..	......	1	..	..	..	......	1	1	..	..
MAIN.	1	12 & boy.	S	......	......	1	1	1	......	1	1	..	1	Cox.	..	1	..	..
	2	"	P	B M.	......	1	1	1	......	1	1	..	1	......	..	1	..	..
	3	"	S	......	C F.	1	1	1	......	1	1	..	1	......	..	1	..	..
	4	"	P	......	......	1	1	1	Capt.	1	1	..	1	......	..	1	..	..
	5	"	S	......	......	1	1	1	......	1	1	..	..	Capt.	..	1	..	1
	6	"	P	......	Cox.	1	1	1	......	1	1	..	..	......	..	1	..	1
	*7	14 & boy.	S	B M.	......	1	1	..	......	1	1	..	..	......	1	1	1	1
	*8	"	P	Q M.	......	1	1	..	......	1	1	..	..	......	1	1	1	1
	*9	"	S	......	......	1	1	..	Cox.	1	1	..	..	......	1	1	..	..
	*10	"	P	......	......	1	1	..	......	1	1	..	..	Capt.	1	1	..	..
	*11	"	S	......	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	12	12 & boy.	P	Q M.	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	13	"	S	......	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	14	"	P	B M.	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	15	"	S	......	......	1	1	..	......	1	..	..	..	......	1	1	..	..
	16	"	P	......	......	..	1	..	......	..	..	..	..	......	..	1	..	..
SPAR.	1	12 & boy.	S	......	C F.	..	1	..	......	1	1	1	1	......	..	1	..	..
	2	8 & boy.	P	......	......	..	1	..	......	1	1	1	1	......	..	1	..	..
	3	"	S	......	......	..	1	..	......	..	1	1	..	......	1	..	..	1
	4	"	P	......	......	..	1	..	......	..	1	1	..	......	1	..	..	1
	5	"	S	......	......	..	1	..	......	..	1	..	..	......	..	..	..	..
	6	"	P	......	......	..	1	..	......	..	1	..	..	......	..	..	..	..
	7	"	S	......	......	..	..	..	......	..	1	..	..	......	..	1	..	..
	8	"	P	......	......	..	..	..	......	..	1	..	..	......	1	1	..	..
	9	"	S	......	......	..	..	..	......	..	..	..	..	......	..	1	..	..
	10	"	P	......	......	..	..	..	......	1	1	..	..	......	..	1	..	..

* Shell guns.

OF 721 MEN AND BOYS, EXCLUSIVE OF OFFICERS AND MARINES.

Master; Passed Midshipman, as Signal Officer;
tain's Clerk.

TOPMEN.				AFTER GUARD.				WAISTERS.				
Seamen.	Ord. Seamen.	Landsmen.	Boys.	Capts. or Coxns. Capts. of guns.	Seamen.	Ord. Seamen.	Landsmen.	Seamen.	Ord. Seamen.	Landsmen.	Messenger boys.	Officers of divisions.
1	..	..	..	......	1	1	2	....	1	2	....	***1st Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
1	..	..	..	......	1	1	3	....	1	1	....	
1	..	..	..	......	1	1	3	....	1	1	....	
1	..	..	..	......	1	1	2	....	1	2	....	
1	..	..	..	......	1	1	3	....	1	1	....	
1	..	..	..	......	1	1	2	....	1	2	....	
1	..	..	..	......	....	1	3	....	1	3	....	***2d Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
1	..	..	..	......	....	1	4	....	1	2	....	
..	..	1	1	......	....	1	3	....	1	3	....	
..	..	1	1	......	....	1	4	....	1	2	....	
..	1	1	1	......	....	1	3	....	1	3	....	
..	1	1	1	......	....	1	2	....	1	2	....	***3d Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
..	1	..	1	......	....	1	2	....	1	3	....	
..	1	..	1	......	....	1	4	....	1	1	....	
..	1	..	..	......	....	1	3	....	1	2	1	
..	1	..	..	Cox..	....	1	3	....	1	2	1	
..	..	..	..	......	....	1	2	1	....	1	....	***4th Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
..	..	..	..	......	....	1	2	1	....	1	....	
..	..	..	..	......	....	1	2	1	....	1	....	
..	..	..	..	......	....	1	2	1	....	1	....	
..	..	..	..	......	....	1	2	1	....	1	....	
..	..	..	..	......	....	1	2	1	....	1	....	
..	..	..	..	......	....	1	3	....	....	2	....	***5th Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
..	..	..	..	......	....	1	3	....	....	2	....	
..	1	..	..	......	....	....	4	....	....	2	1	
..	1	..	..	......	....	....	4	....	....	2	1	
..	1	..	..	Cox..	....	1	4	....	....	2	1	
..	1	..	..	......	....	1	3	....	....	1	1	***6th Division.*** Lieutenant. Midshipman. 1 Quarter Gunner.
..	1	..	..	......	....	1	3	....	....	1	1	
..	1	..	..	......	....	1	3	....	....	1	1	
..	1	..	..	Capt.	....	1	2	....	....	2	1	
..	1	..	..	......	1	1	3	....	2	1	1	
..	1	..	..	......	....	1	2	....	1	1	....	***7th Division.*** Lieut. or P. Mid'n. Midshipman. 1 Quarter Gunner.
1	1	..	..	......	....	1	....	....	....	....	....	
1	1	..	..	......	....	1	....	....	1	....	....	
1	1	..	..	......	....	1	....	....	1	....	....	
1	1	..	..	......	1	1	1	....	1	....	1	
1	1	..	..	......	....	1	1	1	1	....	1	***8th Division.*** Passed Midshipman. Midshipman. 1 Quarter Gunner.
1	1	..	..	......	....	....	1	1	2	....	1	
..	1	..	..	......	1	....	1	....	2	....	1	
..	1	..	..	......	1	1	1	1	2	....	1	
..	1	..	..	......	1	1	1	....	1	....	1	

QUARTER BILL FOR A SHIP OF THE LINE OF 84 GUNS—Continued.

9TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN.			FORETOPMEN.			MAINTOPMEN.			MIZENTOPMEN.			AFTER GUARD.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M	S																				*Quarter Deck.*
Wheel	1 Q. M		P	1 Sea.		P				1 Sea.	S					1 Sea.	S					Master.
Signals	1 Q. M	S											1 Boy		P							
Relieving Tackles	1 Q. M		P													2 O. S.	1 S	1 P				*Forecastle.*
Main Braces	1 C. A. G		P																			Boatswain.
Mizen Top													2 Sea.	1 S	1 P							——
Mizen Mast																			2 S. 2 O. S.	1 Sea. 1 O. Sea. of each watch.		
Main Mast	1 B. M	S																	4 S. 4 O. S.	2 Sea. 2 O. Sea. of each watch.		
Main Top										3 Sea.	1 S	2 P										
Fore Top							2 S. 1 O. S	2 S	1 P	1 Sea. in each watch and 1 O. S. in starboard watch												
Fore Mast																			4 S. 4 O. S.	2 Sea. 2 O. Sea. of each watch.		
Forecastle	1 C. F		P																			
Bell	1 S. C	S																				
Total of each	8	4	4	1	...	1	3	2	1	4	2	2	3	1	2	3	2	1	20	10	10	42 in all.

QUARTER BILL FOR A SHIP OF THE LINE OF 84 GUNS—Continued.

10TH, OR POWDER DIVISION.—***Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shot Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.***

Stations.	Ratings.
In the Forward Magazine	1 Gunner's Mate, 3 Guarter Gunners, and 2 Boys.
In the After Magazine	1 Gunner's Mate, 2 Quarter Gunners, and 2 Boys.
In the Shell room	1 Gunner's Mate; 1 Quarter Gunner.
At the Shell whips	1 Armorer; 4 Landsmen, (Waisters.)
At the Shot lockers	2 Captains Hold; 1 Cooper; 9 Landsmen, (Waisters.)
At the Pumps	1 Carpenter's Mate.
Lights of both Magazines and Shell room	1 Master-at-Arms; 2 Ship's Corporals.
Store room and Armory	1 Yeoman; 1 Armorer's Mate.
Wings and Force pumps	2 Carpenter's Mates; 2 Carpenters, (Waisters and rated Seamen.)

SUPPLYING POWDER.—SCUTTLES.

The lower deck guns, ***forward*** of the shell guns, are to be supplied from the ***outside*** scuttle on the ***starboard*** side of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 1.

The lower deck guns, ***abaft*** the shell guns, are to be supplied from the scuttle on the ***starboard*** side of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 2.

The shell guns, on both lower and main gun decks, are to be supplied from the ***inside*** scuttle on the ***starboard*** side of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 3.

The main deck guns, ***forward*** of the shell guns, and also the forward chase guns on spar deck, are to be supplied from the ***outside*** scuttle on the ***port*** side of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 4.

The main deck guns ***abaft*** the shell guns, and also the after chase guns on spar deck, are to be supplied from the scuttle on the ***port*** side of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 5.

The forward half of spar deck guns, excepting chase guns, are to be supplied from the ***inside*** scuttle on the ***port*** side of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 6.

The after half of spar deck guns, excepting chase guns, are to be supplied from the middle scuttle of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as ***chain of scuttles*** No. 7.

DETAILS OF THE POWDER

Stations.	No. 1.
In the passage to receive and pass charges	1 W. R. Cook.
At passage scuttle on orlop deck to receive charges thereat and pass them to the screen.	1 Musician.
At outside of screen to receive charges thereat and put them into passing boxes.	1 Master of Band.
At lower extremity of canvas shoot to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Quarter Gunner.
On orlop deck to pass up full boxes through scuttle or lower gun deck.	1 Musician.
On lower gun deck at scuttle to receive and deliver full boxes to Powderboys.	1 Seaman, (waister.)
On lower gun deck at scuttle to receive full boxes and pass them up through scuttle on main gun deck.	....
On main gun deck at scuttle to receive and deliver full boxes to Powderboys.	....
On main gun deck at scuttle to receive full boxes and pass them up through scuttle on spar deck.	....
On spar deck at scuttle to receive and deliver full boxes to Powderboys.	....
To run with full boxes, from screen to passing scuttle, and back again with empty boxes.	2 Runnerboys.

One Gunner's Mate is to be stationed on the orlop deck to superintend, generally, the arrangements for passing powder; and, under the authority of the commanding officer of his division, to direct and control the men and boys concerned in passing it on that deck.

DIVISION OF AN 84-GUN SHIP.

CHAINS OR SCUTTLES.

No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
1 Officer's Steward.	1 Cabin Cook.	1 Musician.	1 Officer's Steward.	1 Painter.	1 Landsman (waister.)
1 Musician.	1 Musician.	1 Musician.	1 Musician.	1 Landsman (waister.)	1 Landsman (waister.)
1 Musician.	1 Landsman (waister.)	1 Musician.	1 Musician.	1 Landsman (waister.)	1 Landsman (waister.)
1 Quarter Gunner.	1 Ship's Steward.	1 Quarter Gunner.	1 Quarter Gunner.	1 Sailmaker's Mate.	1 Sailmaker's Mate.
1 Landsman (waister.)	1 Landsman (waister.)	1 Landsman (waister.)	1 Musician.	1 Landsman (waister.)	1 Landsman (waister.)
1 Seaman (waister.	1 Seaman (waister.)	....	....	....	....
....	1 Landsman (waister.)	1 Landsman (waister.)	1 Landsman (waister.)	1 Landsman (waister.)	1 Landsman (waister.)
....	1 Landsman (waister.)	1 Seaman (waister.)	1 Seaman (waister.)	....	....
....	....	....	....	1 Landsman (waister.)	1 Landsman (waister.)
....	....	....	....	1 Seaman (waister.)	1 Seaman (waister.)
2 Runner-boys.	3 Runner-boys.	3 Runner-boys.	3 Runner-boys.	2 Runner-boys.	2 Runner boys.

Each petty officer stationed to receive empty passing boxes and strike them over a fire-tub, aided by those immediately about his line of scuttles, is to see that his canvas shoot, fire-tub, and wet swabs are in place, and properly prepared.

SURGEON'S DIVISION.

The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the cockpit.

CHAPLAIN.

The Chaplain is also stationed in the cockpit.

MARINES.

Officers, non-commissioned officers, privates, and musicians, to be stationed on spar deck. When required, the marines may be stationed at the great guns or howitzers. They are to be distributed as the Captain may direct.

PURSER.

The Purser and his Clerk in charge of stores.

KELETON WATCH BIL

FOR A FRIGATE OF 50 GUNS.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Other Petty Offic's to keep watch.	Petty Offic's, idlers.	Bandsmen, idlers.	Total.
Forecastlemen	4	2	18	26	8					58
Foremastmen			4							4
Foretopmen	2	2	16	22	6	6				54
Mainmastmen			4							4
Maintopmen	2	2	18	24	6	6				58
Mizenmastmen			2							2
Mizentopmen	2	2	8	18	4	6				40
After Guard	2		7	25	73	7				114
Messenger and Sideboys						12				12
Bandsmen									10	10
Petty officers							32	14		46
Total of each grade	12	8	77	115	97	37	32	14	10	402

QUARTER BILL FOR A FRIGATE OF 50 GUNS, WITH A COMPLE

QUARTER DECK.—Captain; Executive Officer;
Aids to Captain;

Decks.	Number of gun.	Number of men.	Watch to which gun's crew belong.	Petty officers, captains of guns.	FORECASTLEMEN.				FORETOPMEN.					MAINTOPMEN.				
					Capt's or coxswains, captains of guns.	Seamen.	Ordinary seamen.	Landsmen.	Capt's or coxswains, captains of guns.	Seamen.	Ordinary seamen.	Landsmen.	Boys.	Capt's or coxswains, captains of guns.	Seamen.	Ordinary seamen.	Landsmen.	Boys.
MAIN.	1	12 & boy	S	......	Capt.	1	1	1	......	1	1	..	1	......	1	1	1	..
	2	"	P	......	......	1	1	..	Capt.	1	1	1	..	......	1	1	1	..
	3	"	S	......	......	..	1	..	......	1	..	1	..	......	1	1	..	1
	4	"	P	......	......	1	1	..	......	..	1	1	1	Capt.	1	1	..	..
	5	"	S	......	......	1	1	..	......	1	1	..	..	......	..	1	..	..
	*6	14 & boy	P	......	Capt.	1	2	..	......	1	1	1	..	......	..	1	..	1
	*7	"	S	......	......	1	2	..	Capt.	..	1	..	..	......	1	1	1	..
	*8	"	P	B M	......	1	2	1	......	1	1	..	1	......	1	1	..	..
	*9	"	S	......	......	1	2	..	......	1	1	..	..	Capt.	1	1	..	..
	*10	"	P	Q M	......	1	2	1	......	1	1	..	..	......	1	1	1	1
	11	12 & boy	S	......	Cox.	1	1	1	......	..	..	..	..	......	1	1	1	1
	12	"	P	B M	......	..	1	1	......	1	1	..	..	......	..	1	1	..
	13	"	S	......	......	..	1	..	......	..	1	1	..	Cox.	1	..	..	..
	14	"	P	......	......	1	1	1	......	..	1	..	..	......	1	..	..	..
	15	"	S	Q M	......	1	1	1	......	1	1	..	..	......	1	1	..	..
SPAR.	1	12 & boy	S	......	Capt.	1	1	1	......	1	2	1	1	......	..	..	..	..
	2	8 & boy	P	......	......	..	1	..	Cox.	..	..	..	..	......	1	1	..	..
	3	"	S	B M	......	1	..	..	......	..	1	..	..	......	..	1	..	..
	4	"	P	......	......	..	1	..	......	..	..	..	..	Cox.	1	1	..	..
	5	"	S	Q M	......	..	1	..	......	1	..	..	..	......	..	1	..	..
	6	"	P	......	Cox.	..	..	..	......	..	1	..	..	......	1	1	..	..
	7	"	S	......	......	..	1	..	Cox.	..	1	..	..	......	..	1	..	..
	8	"	P	......	......	1	1	..	......	..	1	..	..	......	..	1	..	..
	9	"	S	......	......	..	..	..	......	1	1	..	..	......	..	2	..	..
	10	12 & boy	P	Q M	......	1	..	..	......	1	2	..	..	......	..	2	..	..

* Shell guns.

MENT OF 402 MEN AND BOYS, EXCLUSIVE OF OFFICERS AND MARINES.

Master; Passed Midshipman, as Signal Officer;
and Captain's Clerk.

MIZENTOPMEN.					AFTER GUARD.					
Capt's or coxswains, captains of guns.	Seamen.	Ordinary seamen.	Landsmen.	Boys.	Capt's or coxswains, captains of guns.	Seamen.	Ordinary seamen.	Landsmen.	Messenger boys.	Officers of divisions.
......	....	1	....	....	......	....	1	1	....	*1st Division.*
......	....	1	....	1	......	....	....	2	....	Lieutenant.
Capt.	....	1	....	....	......	....	1	4	....	Midsh'pman.
......	....	1	1	....	......	....	....	3	....	1 Quarter Gunner.
Cox.	....	....	1	1	......	....	1	4	....	
......	1	1	....	....	......	....	1	3	....	*2d Division.*
......	1	1	....	1	......	....	1	3	....	Lieutenant.
......	....	1	....	....	......	....	1	3	....	Midshipman.
......	....	1	1	1	......	....	1	3	....	1 Quarter Gunner.
......	....	1	....	....	......	....	1	2	....	
......	....	1	....	....	......	....	1	3	....	*3d Division.*
......	1	....	....	1	......	....	1	3	....	Lieutenant.
......	1	1	....	....	......	....	1	4	1	Midshipman.
Cox.	....	1	1	....	......	....	1	3	1	1 Quarter Gunner.
......	....	....	....	....	......	....	1	3	1	
......	1	1	....	....	......	....	1	1	....	*4th Division.*
......	....	1	....	....	......	....	1	2	1	Lieutenant.
......	....	1	....	....	......	....	1	2	1	Midshipman.
......	....	1	....	....	......	....		2	1	1 Quarter Gunner.
......	....	1	....	....	......	....		2	1	
......	....	1	....	....	......	....		2		*5th Division.*
......	....	....	....	....	......	1		2		Lieut. or Passed Midshipman.
Capt.	....	....	....	....	......	....	1	2		Midshipman.
......	....	....	....	....	Capt.	....	1	2		1 Quarter Gunner.
......	1	....	....	....	......	....	1	3		

QUARTER BILL FOR A FRIGATE CARRYING 50 GUNS—Continued.

6th, or Master's Division.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN.			FORETOPMEN.			MAINTOPMEN.			MIZENTOPMEN.			AFTER GUARD.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M.	S																				
Wheel	1 Q. M.		P	1 Sea.		P				1 Sea.	S					1 Sea.	S					
Signals	1 Q. M.	S											1 Boy.		P							*Quarter Deck.*
Relieving Tackles	1 Q. M.		P													2 O. S.		P				Master.
Main Braces	1 C. A. G		P																			
Mizentop													2 Sea.	S	P							
Mizenmast																			2 Sea.	S	P	*Forecastle.*
Mainmast	1 B. M.	S																	4 Sea.	S	P	Boatswain.
Maintop										2 Sea	S	P										
Foretop							2 Sea.		P													
Foremast																			4 Sea.	S	P	
Forecastle	1 C. F.		P																			
Bell	1 S. C.	S																				
Total of each	8	4	4	1	...	1	2	...	2	3	2	1	3	1	2	3	1	2	10	5	5	30 in all.

QUARTER BILL FOR A FRIGATE OF 50 GUNS—Continued.

7TH, OR POWDER DIVISION.—*Lieutenant, or Passed Midshipman, to command; Sailmaker at Shot Lockers; Gunner in the Fore Magazine; and Carpenter at the Pumps*

Stations.	Ratings.
In the Forward Magazine	1 Gunner's Mate; 1 Quarter Gunner; 1 Seaman, (F. C.—S. W.)
In the After Magazine	1 Gunner's Mate; 1 Quarter Gunner; 1 Seaman, (A. G.—P. W.)
In and at the Shell room	1 Quarter Gunner; 1 Ship's Corporal.
Receive and whip Shells	1 Armorer; 2 Landsmen, (A. G., 1 in each watch.)
Shot lockers	2 Captains Hold; 1 Cooper; 1 Landsman, (A. G.—S. W.)
Pumps	1 Carpenter's Mate.
To light Magazines and Shell room, and other prescribed places, if there be any, and attend to all lights	1 Master at-Arms; 1 Ship's Corporal.
Store-room	1 Yeoman.
Wings and Force pumps	1 Carpenter's Mate.

SUPPLYING POWDER.—SCUTTLES.

The main deck guns, forward of the shell guns, and also the forward chase guns on the spar deck, are to be supplied from the starboard scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The main deck guns, abaft the shell guns, and also the chase guns aft on spar deck, are to be supplied from the starboard scuttle of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No 2.

The shell guns are to be supplied from the middle scuttle of the forward magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No. 3.

The forward half of the spar deck guns, excepting chase guns, are to be supplied from the port scuttle of the forward magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No 4.

The after half of the spar deck guns, excepting chase guns, are to be supplied from the port scuttle of the after magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No. 5.

DETAILS OF THE POWDER

Stations.
In the passage to receive and pass charges
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen.
At outside of screen, to receive charges thereat and put them into passing boxes
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.
On orlop deck, to pass up full boxes through scuttle on main deck
On main deck, at scuttle, to receive and deliver full boxes to Powderboys
On main deck, at scuttle, to receive full boxes, and pass them up through scuttle on spar deck.
On spar deck, at scuttle, to receive and deliver full boxes to Powderboys
To run with full boxes from screen to passing scuttle, and back again with empty boxes.
Each petty officer stationed to receive empty passing boxes, and strike them over a fire-tub, aided by those immediately about his line of scuttles, is to see that his canvas shoot, fire-tub, and wet swabs are in place, and properly prepared.

DIVISION OF A 50 GUN SHIP.

CHAINS OF SCUTTLES.

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
1 W. R. Cook.	1 Officer's Steward.	1 Painter.	1 Cabin Cook.	1 Officer's Steward.
1 Musician.	1 Musician.	1 Musician.	1 Musician.	1 Musician.
1 Master of Band.	1 Musician.	1 Musician.	1 Musician.	1 Musician.
1 Qr. Gunner.	1 Qr. Gunner.	1 Qr. Gunner.	1 Ship's Steward.	1 Qr. Gunner.
1 Musician.	1 Landsman (A. G.—S. W.)	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—P. W.)
1 Sailmaker's Mate.	1 Seaman (A. G.—S. W.)	1 Seaman (A. G.—P. W.)	....	....
....	....	....	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—P. W.)
....	....	....	1 Seaman (A. G.—S. W.)	1 Seaman (A. G.—P. W.)
2 Runnerboys.	2 Runnerboys.	3 Runnerboys.	3 Runnerboys.	2 Runnerboys.

SURGEON'S DIVISION.

The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the cockpit.

CHAPLAIN.

The Chaplain is also stationed in the cockpit.

MARINES.

Officers, non-commissioned officers, musicians, and privates, to be stationed on spar deck. When required, the marines may be stationed at the great guns or howitzers. They are to be distributed as the Captain of the ship may direct.

PURSER.

The Purser and his Clerk in charge of stores.

SKELETON WATCH BILL

FOR A RAZEE SLOOP, (*frigate cut down*,) ARMED WITH TWO 10-INCH GUNS OF 12,000 LBS. EACH, SIXTEEN 8-INCH OF 63 CWT. EACH, AND FOUR 32-POUNDERS OF 57 CWT. EACH.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, idlers.	Total.
Forecastlemen	2	2	14	14	8	....	......	....	40
Foremastmen	....	....	2	....	....	....	......	....	2
Foretopmen	2	2	10	16	4	2	......	....	36
Mainmastmen	....	....	2	....	....	....	......	....	2
Maintopmen	2	2	10	18	4	2	......	....	38
Mizenmastmen	....	....	....	....	....	....	......	....	......
Mizentopmen	2	1	5	12	2	6	......	..	28
After Guard	2	....	5	14	29	....	......	....	50
Messenger and Sideboys	....	....	....	....	....	7	......	....	7
Petty Officers	....	....	....	....	....	....	20	12	32
Total of each grade	10	7	48	74	47	17	20	12	235

QUARTER BILL FOR A RAZEE SLOOP WITH 22 GUNS, AND A COM

QUARTER DECK.—Captain; First Lieutenant; Master;

Decks.	Number of gun.	Number of men.	Watch to which gun's crew belong.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
					Capt's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Capt's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
Main.	1	12 and Boy	S	......	Cox.	1	1	1	......	1	1	1	..
	2	14 and Boy	P	......	......	1	1	1	Capt.	1	2	1	..
	3	"	S	......	......	1	1	1	Capt.	1	1	1	..
	4	"	P	......	Cox.	1	1	1	......	1	1	1	..
	5	"	S	Q M	......	1	1	1	Cox.	1	2	..	..
	6	"	P	......	......	1	1	1	......	1	1	..	..
	7	"	S	......	......	1	1	1	......	..	1	..	..
	8	"	P	B M	......	1	1	1	Cox.	1	2	..	..
	9	"	S	......	......	1	1	..	......	1	1	..	..
	10	12 and Boy	P	......	......	1	1	..	......	..	1	..	..
Spar.	Pivot Forward.	18 and P. Man.	S	......	Capt.	1	1	..	......	..	1	..	..
			P	Q M	......	1	1	..	......	..	1	..	..
	Pivot Aft.	18 and P. Man.	S	B M	......	..	1	..	......	..	1	..	..
			P	......	......	..	1	..	......	..	..	..	..

NT OF 235 MEN AND BOYS, EXCLUSIVE OF OFFICERS AND MARINES.

ficer ; Aid to Captain ; and Captain's Clerk.

OPMEN.				MIZENTOPMEN.					AFTER GUARD.						
Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Capt's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Capt's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger Boys.	Marines.	Officers of divisions.
--	1	1	--	------	--	1	--	1	------	--	--	1	----	1	*1st Division.*
1	1	1	--	------	--	1	--	1	------	--	1	--	----	1	Lieutenant.
1	2	1	--	------	--	1	--	1	------	--	1	--	----	1	Midshipman.
1	2	--	--	------	--	1	--	1	------	--	1	--	----	1	1 Qr. Gunner.
1	1	--	--	------	--	1	--	--	------	--	1	1	1	1	
--	2	1	--	Capt.	1	1	--	--	------	--	1	--	1	1	*2d Division.*
1	2	--	--	------	1	1	1	--	------	--	1	1	1	1	Lieutenant.
1	1	--	--	------	--	1	--	--	------	--	1	1	1	1	Midshipman.
1	1	--	--	Capt.	--	2	--	--	------	--	1	2	1	1	1 Qr. Gunner.
--	1	--	--	Cox.	1	1	1	--	------	--	--	3	1	1	
--	1	--	--	------	--	--	--	--	------	--	1	--	----	4	*3d Division.*
--	1	--	--	------	--	1	--	--	------	--	--	--	----	3	Lieutenant.
--	1	--	--	------	--	--	--	--	------	1	1	1	----	3	Midshipman.
--	1	--	--	------	--	--	--	--	Capt.	1	2	1	----	2	1 Qr. Gunner.

QUARTER BILL FOR A RAZEE SLOOP OF 22 GUNS—Continued.

4th, or Master's Division.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN.			FORETOPMEN.			MAINTOPMEN.			MIZENTOPMEN.			AFTER GUARD.			MASTMEN.			Messenger Boy.	OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.			Watch.			
Conn	1 Q. M.	S																					
Wheel	1 Q.M.		P	1 Sea.	S					1 Sea.		P				1 Sea.	S						*Quarter Deck.*
Signals	1 Q.M.	S																				1 P W	Master.
Relieving Tackles	1 Q.M.		P													2 O.S.	S	P					
Main Braces	1 C.A.G.	S																					
Mizen Top													2 Sea.	S	P								
Main Mast	1 B.M.	S																	2 Sea.	S	P		*Forecastle.*
Main Top										2 Sea.	S	P											Boatswain.
Fore Top							2 Sea.	S	P														
Fore Mast																			2 Sea.	S	P		
Forecastle	1 C.F.		P																				
Bell	1 S.C.		P																				
Total of each	8	4	4	1	1	....	2	1	1	3	1	2	2	1	1	3	2	2	4	2	2	1	24 in all.

QUARTER BILL FOR A RAZEE SLOOP OF 22 GUNS—Continued.

5TH, OR POWDER DIVISION.—*Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.*

Stations.	Ratings.
In the Forward Magazine	2 Quarter Gunners; 1 Seaman, (F. C.—P. W.)
In the After Magazine	1 Gunner's Mate; 1 Quarter Gunner; 1 Seaman, (A. G.—S. W.)
In and at the Shell rooms	1 Sailmaker's Mate; 1 Yeoman; 1 Landsman, (A. G.—P. W.)
Receive and whip Shells	1 Capt. Hold; 1 Ship's Corporal; 4 Lands, (A. G., 2 in each watch.)
Pumps	1 Carpenter's Mate.
Light Magazine and Shell rooms, and other prescribed places, and attend to all lights	1 Master-at-Arms; 1 Ship's Corporal.
Storeroom	
Wings and Force pumps	1 Cooper; 1 Landsman, (A. G.)

SUPPLYING POWDER.—SCUTTLES.

The *forward* half of the *main deck guns* are to be supplied from the *starboard* scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The *after* half of the *main deck guns* are to be supplied from the scuttle of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

Both pivot guns on the *spar deck* are to be supplied from the *port* scuttle of the forward magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No. 3.

DETAILS OF THE POWDER DIVISION OF A RAZEE SLOOP OF 22 GUNS.

Stations.	CHAINS OF SCUTTLES.		
	No. 1.	No. 2.	No. 3.
In the passage, to receive and pass charges	W. room Cook.	1 Officer's Steward.	Cabin Cook.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen.	1 Landsman (A. G.—S. W.)	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—S. W.)
At outside of screen, to receive charges thereat and put them into passing boxes	1 Landsman (A. G.—P. W.)	1 Officer's Steward.	1 Landsman (A. G.—P. W.)
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Ship's Steward.	1 Armorer.	1 Seaman (A. G.—P. W.)
To pass up full boxes through scuttle on main deck	1 Landsman (A. G.—S. W.)	1 Landsman (A. G.—S. W.)	1 Landsman (A. G.—S. W.)
On main deck, at scuttle, to receive and deliver full boxes to Powderboys	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—P. W.)	....
On main deck, at scuttle, to receive full boxes, and pass them up through scuttle on spar deck.	....	....	1 Landsman (A. G.—P. W.)
On spar deck, at scuttle, to receive and deliver full boxes to Powdermen	....	....	1 Landsman (A. G.—S. W.)
To run with full boxes from screen to passing scuttle, and then back again with empty boxes.	2 Runnerboys.	2 Runnerboys.	2 Runnerboys.

The petty officers and seamen stationed to receive empty passing boxes, and strike them over the fire-tubs, aided by those immediately about their respective lines of scuttles, are to see that their canvas shoots, fire tubs, and wet swabs are in place, and properly prepared.

Surgeon's Division.—The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

The Chaplain's station is also in the same apartment.

Marines.—Officers, non-commissioned officers, musicians, and privates, to be stationed on deck. When required, the marines may be stationed at the great guns, or howitzers. They may be distributed as the Captain of the ship may direct.

The Purser and his Clerk in charge of stores.

SKELETON WATCH BILL

FOR A SLOOP-OF-WAR OF THE FIRST CLASS, ARMED WITH EIGHT 8-INCH GUNS OF 55 CWT. EACH, AND TWELVE 32-POUNDERS OF 42 CWT. EACH.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, idlers.	Total.
Forecastlemen	2	2	8	10	2	....	......	....	24
Foremastmen	....	....	2	....	....	....	......	....	2
Foretopmen	2	2	6	10	2	2	......	....	24
Mainmastmen	....	....	2	....	....	....	......	....	2
Maintopmen	2	2	6	10	2	4	......	....	26
Mizentopmen	2	....	4	7	....	4	......	....	17
After Guard	2	....	2	10	16	....	......	....	30
Messenger and Sideboys	....	....	....	....	....	4	......	....	......
Petty Officers	....	....	....	....	....	....	16	11	27
Total	10	6	30	47	22	14	16	11	156

QUARTER BILL FOR A [illegible] OF THE FIRST CLASS, WITH 20 [illegible] AND A COMPLEMENT OF 15[illegible] MEN AND

QUARTER DECK.—[illegible] First Lieutenant; Master; Spar[illegible]

Deck	Number of guns	Number of men	Watch to which gun's crew belongs	Petty Officers, Captains of guns	FORECASTLEMEN. Capt's or Coxswains, Captains of guns	Seamen	Ordinary Seamen	Landsmen	FORETOPMEN. Capt's or Coxswains, Captains of guns	Seamen	Ordinary Seamen	Landsmen	Boys	MAINTOPMEN. Capt's or Coxswains, Captains of guns	Seamen	Ordinary Seamen	Landsmen	Boys
	1	10 & Boy	1	—	Capt.	[illegible]	[illegible]	[illegible]	Cox.	[illegible]	[illegible]	—	—	—	—	1	—	1
	2	·	2	—	—	[illegible]	[illegible]	[illegible]	Capt.	[illegible]	[illegible]	[illegible]	—	—	—	1	1	1
	3	·	1	—	Cox.	[illegible]	[illegible]	—	—	[illegible]	[illegible]	—	—	—	—	1	[illegible]	—
	4	·	2	—	—	[illegible]	[illegible]	—	Cox.	—	[illegible]	—	—	Capt.	—	1	—	—
[illegible]	5	·	1	3 M	—	[illegible]	—	—	—	—	[illegible]	—	—	—	—	1	—	—
	6	·	2	—	Cox.	[illegible]	[illegible]	—	—	—	[illegible]	—	—	—	1	1	—	—
	7	12 & Boy	1	—	—	[illegible]	[illegible]	—	Capt.	—	[illegible]	—	—	Cox.	1	1	—	—
	8	··	2	3 M	—	[illegible]	—	—	—	—	[illegible]	—	—	—	—	1	—	—
	9	··	1	—	—	—	[illegible]	—	—	1	[illegible]	—	—	Capt.	1	1	—	—
	10	··	2	—	—	—	[illegible]	—	—	1	[illegible]	—	—	Cox.	1	1	—	—

GUNS, VIZ: TWELVE 32-POUNDERS OF 42 CWT. AND EIGHT 8-INCH OF BOYS, EXLUSIVE OF OFFICERS AND MARINES.

Officer ; Aid to Commander ; and Commander ; and Commander's Clerk.

MIZENTOPMEN.					AFTER GUARD.						
Capt's or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Capt's or Coxswains, Captains of guns.	Seaman.	Ordinary Seamen.	Landsmen.	Messenger Boys.	Marines.	Officers of divisions.
------	--	1	--	--	------	--	1	--	----	----	*1st Division.*
------	--	--	--	--	------	--	1	--	----	----	Lieutenant.
------	1	--	--	--	------	--	1	1	1	----	Midshipman.
------	1	1	--	--	------	--	1	1	1	----	
Capt.	1	1	--	--	------	--	1	1	1	----	*2d Division.*
------	--	--	--	--	------	--	1	2	1	----	Lieutenant.
------	--	1	--	1	------	--	1	2	----	1	Midshipman.
Capt.	--	1	--	1	------	1	1	2	----	1	*3d Division.*
------	--	1	--	1	Capt.	1	1	2	----	----	Lieutenant.
------	--	1	--	1	Capt.	--	1	1	----	2	Midshipman.

One Quarter Gunner must attend from No. 1 to 5, both inclusive; and one from No. 6 to 10, both inclusive.

Two divisions of guns may be preferred to three.

QUARTER BILL FOR A SLOOP-OF-WAR, FIRST CLASS, WITH 20 GUNS—Continued.

4TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORETOPMEN.			MAINTOPMEN.			MIZENTOPMEN.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M.	S.														*Quarter Deck.* Master.
Wheel	2 Q. M.	S.	P.													
Relieving Tackles	1 Q. M.		P.													
Mizen Top										1 Sea.		P				
Main Mast	1 B. M.	S.											1 Sea.	S.		
Main Top							2 Sea.	S.	P.							*Forecastle.* Boatswain.
Fore Top				2 Sea.	S.	P.										
Fore Mast													1 ea.		P.	
Forecastle	1 C. F.		P.													
Total of each	6	3	3	2	1	1	2	1	1	1	....	1	2	1	1	13 in all.

QUARTER BILL FOR A SLOOP-OF-WAR, FIRST CLASS, WITH 20 GUNS—Continued.

5TH, OR POWDER DIVISION.—***Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell and Shot Lockers; Gunner in the Magazine; and Carpenter at the Pumps.***

Stations.	Ratings.
In the Magazine	1 Gunner's Mate: 1 Quarter Gunner.
In and at Shell room	1 Quarter Gunner; 1 Sailmaker's Mate.
Receive and whip shells	1 Ship's Corporal; 1 Armorer; 1 Cooper.
Shot Lockers	1 Captain of Hold; 1 Ship's Cook.
Pumps	1 Carpenter's Mate.
Light Magazine and Shell room, and other prescribed places, if any, and attend to all lights below	1 Master-at-Arms.

SUPPLYING POWDER.—SCUTTLES.

The 32-*pounders* are to be supplied from the *starboard* scuttle of the magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The 8-*inch shell guns* are to be supplied from the *port* scuttle of the magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

DETAILS OF THE POWDER DIVISION FOR A SLOOP-OF-WAR OF 20 GUNS.

Stations.	CHAINS OF SCUTTLES.	
	No. 1.	No. 2.
In the passage, to receive and pass charges	1 Cabin Cook.	1 Wardroom Cook.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen	1 Officer's Steward.	1 Officer's Steward.
At outside of screen, to receive charges thereat and to put them into passing boxes	1 Landsman (A. G.—S. W.)	1 Landsman. (A. G.—P. W.)
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Yeoman.	1 Ship's Steward.
To pass up full boxes through scuttle on deck	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—S. W.)
On deck, at scuttle, to receive and deliver full boxes to Powderboys	1 Foremastman (S. W.)	1 Mainmastman (P. W.)
To run with full boxes from screen to passing scuttle, and then back again with empty boxes	2 Runnerboys.	2 Runnerboys.

The petty officers stationed to receive empty passing boxes, and strike them over the fire-tubs, aided by those immediately about their respective lines of scuttles, are to see that their canvas shoots, fire-tubs, and wet swabs are in place, and properly prepared.

SURGEON'S DIVISION.

The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

MARINES.

Officers, non-commissioned officers, musicians, and privates to be stationed on deck. When required, the marines may be stationed at the great guns or howitzers. They may be distributed as the Captain of the ship may direct.

The Purser and his Clerk in charge of stores.

SKELETON WATCH BILL

FOR A SLOOP-OF-WAR OF THE THIRD CLASS—"MARION," "DECATUR," AND "DALE"—ARMED WITH TWO 32-POUNDERS OF 33 CWT. AND TWELVE 32-POUNDERS OF 27 CWT.

Stations.	Captain.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, idlers.	Total.
Forecastlemen	2	1	4	7	....	....	......	....	14
Foretopmen	2	2	3	6	....	1	......	....	14
Maintopmen	2	2	3	6	....	2	......	....	15
Mizentopmen	....	....	4	4	....	4	......	....	12
After Guard	2	....	1	4	7	....	......	....	14
Messenger and Sideboys	....	....	....	....	....	4	......	....	4
Petty Officers	....	....	....	....	....	....	13	11	24
Total of each grade	8	5	15	27	7	11	13	11	97

QUARTER BILL FOR A SLOOP-OF-WAR OF THE THIRD CLASS, WITH 27 CWT., AND A COMPLEMENT OF 97 MEN AND

QUARTER DECK.—Commander; First Lieutenant;

Deck.	Number of gun.	Number of men.	Watch to which gun's crew belong.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.			
					Cap's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Cap's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Boys.
UPPER.	1	8 and Boy..	S	......	Capt.	1	1	....	Cox.	....	1	1
	2	6 and Boy..	P	B M	......	1	1	....	Cox.	....	1	....
	3	"	S	......	Cox.	1	1	....	......	....	1	....
	4	"	P	......	......	1	1	....	Capt.	....	1	....
	5	"	S	......	......	....	1	....	Capt.	1	1	....
	6	"	P	......	......	....	1	....	......	....	1	....
	7	"	S	......	......	....	1	....	......	....	....	....

14 GUNS, VIZ: TWO 32-PDRS. OF 33 CWT. AND TWELVE 32-PDRS OF BOYS, EXCLUSIVE OF OFFICERS AND MARINES.

Master; Aid to Commander; and Commander's Clerk.

MAINTOPMEN.				MIZENTOPMEN.			AFTER GUARD.				Messenger and Sideboys.	Officers of divisions.	
Cap's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Boys.	Seamen.	Ordinary Seamen.	Boys.	Captains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.			
......	..	1	..	1	1	....	......	..	..	..	....	*1st Division.*	One Quarter Gunner must attend from No. 1 to 4, both inclusive; and one from No. 5 to 7, both inclusive. Two divisions of guns may be preferred to three, in which case the Master's division becomes the 3d, and the Powder division the 4th.
......	..	1	1	....	....	....	......	..	..	..	....	Lieutenant.	
Cox.	..	1	1	....	....	....	......	..	..	..	....	Midshipman.	
Cox.	..	1	..	....	....	....	......	..	..	..	1	*2d Division.*	
......	..	..	..	1	1	....	......	..	..	..	1	Lt.; Mid'n.	
Capt.	1	1	..	1	....	....	......	..	..	..	1	*3d Division.*	
Capt.	..	1	..	....	....	....	Capt.	1	1	..	1	Lt.; Mid'n.	

QUARTER BILL FOR A SLOOP OF WAR, THIRD CLASS, WITH 14 GUNS—Continued.

4TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORETOPMEN.			MAINTOPMEN.			MIZZENTOPMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M	S											
Wheel	2 Q. M	S	P										*Quarter Deck.* Master.
Relieving Tackles	1 Q. M		P										
Main Braces	1 C. A. G.		P										
Mizzen Top										1 Seaman		P	
Main Mast	1 B. M.	S											
Main Top							2 Seamen	S	P				
Fore Top				2 Seamen	S	P							*Forecastle.* Boatswain.
Forecastle	1 C. F.		P										
Bell	1 S. C	S											
Total of each	8	4	4	2	1	1	2	1	1	1	....	1	13 in all.

14 GUNS, VIZ: TWO 32-PDRS. OF 33 CWT. AND TWELVE 32-PDRS OF
BOYS, EXCLUSIVE OF OFFICERS AND MARINES.

Master; Aid to Commander; and Commander's Clerk.

MAINTOPMEN.				MIZENTOPMEN.			AFTER GUARD.						
Cap's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Boys.	Seamen.	Ordinary Seamen.	Boys.	Captains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger and Sideboys.	Officers of divisions.	
......	..	1	..	1	1	....	......	..	..	..	....	*1st Division.*	One Quarter Gunner must attend from No. 1 to 4, both inclusive; and one from No. 5 to 7, both inclusive. Two divisions of guns may be preferred to three, in which case the Master's division becomes the 3d, and the Powder division the 4th.
......	..	1	1	....	....	....	......	..	..	..	....	Lieutenant.	
Cox.	..	1	1	....	....	....	......	..	..	..	....	Midshipman.	
Cox.	..	1	..	....	....	....	......	..	..	..	1	*2d Division.*	
......	..	..	..	1	1	....	......	..	..	..	1	Lt.: Mid'n.	
Capt.	1	1	..	1	....	....	......	..	..	..	1	*3d Division.*	
Capt.	..	1	..	....	....	....	Capt.	1	1	..	1	Lt.: Mid'n.	

DETAILS OF THE POWDER DIVISION OF A SLOOP OF 14 GUNS.

Stations.	CHAINS OF SCUTTLES.	
	No. 1.	No. 2.
In the passage, to receive and pass charges	1 Cabin Cook.	1 Ward room Cook.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen	1 Officer's Steward.	1 Officer's Steward.
At outside of screen, to receive charges thereat and put them into passing boxes	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—S. W.)
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Yeoman.	1 Ship's Steward.
To pass up full boxes through scuttle on deck	1 Ord. Seaman (A. G.—S. W.)	1 Ord. Seaman (A. G.—P. W.)
On deck, at scuttle, to receive and deliver full boxes to Powderboys	1 Ord. Seaman (Mz.T.—P.W.)	1 Ord. Seaman (Mz.T.—P.W.)
To run with full boxes from screen to passing scuttle, and then back again, with empty boxes	2 Runnerboys.	2 Runnerboys.

The petty officers stationed to receive empty passing boxes and strike them over a fire-tub, aided by those immediately about their respective lines of scuttles, are to see that their canvas shoots, fire-tubs, and wet swabs are in place, and properly prepared for use.

SURGEON'S DIVISION.

The Surgeon, his Assistant, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

MARINES.

Officers, non-commissioned officers, musicians, and privates to be stationed on deck. When required, the marines may be stationed at the great guns, or howitzers. They are to be distributed as the Captain of the ship may direct.

The Paymaster and his Clerk in charge of stores.

QUARTER BILL FOR A SLOOP OF WAR, THIRD CLASS, WITH 14 GUNS—Continued.

5TH, OR POWDER DIVISION.—*Lieutenant, or Passed Midshipman, to command; Sailmaker at Shell and Shot Lockers; Gunner, in the Magazine; and Carpenter at the Pumps.*

STATIONS.	RATINGS.
In the Magazine	1 Gunner's Mate; 1 Quarter Gunner.
In and at Shell room	1 Sailmaker's Mate; 1 Landsman (A. G.—S. W.)
Receive and whip Shells	1 Armorer; 1 Cooper; 1 Landsman (A. G.—P. W.)
Shot lockers	1 Captain Hold; 3 Landsmen (A. G.—2 S. W., and 1 P. W.)
Pumps	1 Ordinary Seaman (A. G.—P. W.) Carpenter's crew.
Light Magazine and Shell room, and other prescribed places, if any, and attend to all lights.	1 Master-at-Arms; 1 Ship's Corporal.

SUPPLYING POWDER.—SCUTTLES.

The 32-pounders *of 27 cwt.* are all to be supplied from the *starboard* scuttle of the magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The 32-pounders *of 33 cwt.* are to be supplied from the port scuttle of the magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

ENGINE WATCH BILL WHEN UNDER STEAM.

Senior First Assistant Engineer.]					First Watch.				[Junior Third Assistant Engineer.	
Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.		Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	First Relief. 2 4 6 8 Port Watch.		First Relief. 1 3 5 7 Starboard Watch.				First Relief. 26 28 30 32 Port Watch.		First Relief. 25 27 29 31 Starboard Watch.	
Junior First Assistant Engineer.]					**Second Watch.**				**[Senior Third Assistant Engineer.**	
Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.		Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	Second Relief. 10 12 14 16 Port Watch.		Second Relief. 9 11 13 15 Starboard Watch.				Second Relief. 34 36 38 40 Port Watch.		Second Relief. 33 35 37 39 Starboard Watch.	

ENGINE WATCH BILL WHEN UNDER STEAM—Continued.

Senior Second Assistant Engineer.]				Third Watch.		[Junior Second Assistant Engineer.			
Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.	Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	Third Relief. Port Watch.		Third Relief. Starboard Watch.			Third Relief. Port Watch.		Third Relief. Starboard Watch.	
	18		17			42		41	
	20		19			44		43	
	22		21			46		45	
	24		23			48		47	

QUARTER BILL FOR A SCREW FRIGATE OF THE FIRST CLASS WITH OF OFFICERS

QUARTER DECK.—Captain; Executive Officer; Aids to Captain;

Decks.	No. of guns.	No. of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
					Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
MAIN.	1	16 & P. Man.	S	......	Capt.	1	2	1	......	......	1	1	......
	2	"	P	......	......	1	1	1	Capt.	......	2	1	......
	3	"	S	......	Cox.	1	2	1	......	......	1	1	......
	4	"	P	......	......	1	1	1	......	1	1	1	......
	5	"	S	Q M	......	1	1	1	......	1	2	1	......
	6	"	P	......	Capt.	1	2	1	......	1	1	......	......
	7	"	S	B M	......	1	1	1	......	1	2	......	......
	8	"	P	......	......	1	2	1	......	1	1	1	......
	9	"	S	......	......	1	1	......	Cox.	1	1	1	......
	10	"	P	B M	......	1	1	......	......	1	2	......	......
	11	"	S	......	......	1	2	1	......	1	1	......	......
	12	"	P	Q M	......	1	2	......	......	1	1	......	......
SPARS.	Pivot	20 & P. Man.	P	B M.	......	1	1	1	......	......	2	1	......
			S	......	......	......	1	......	Capt.	1	1	......	......
	1	14 & Boy.	S	......	Capt.	1	1	1	......	1	1	1	......
	2	"	P	......	......	1	1	1	......	1	1	1	......
	3	"	S	......	......	1	1	......	......	1	1	......	......
	4	"	P	......	......	1	2	......	Cox.	1	1	......	......
	5	"	S	......	......	1	1	......	......	1	2	......	......
	6	"	P	......	......	1	1	......	......	1	1	......	......
	7	"	S	......	......	1	1	......	......	1	1	......	......
	Pivot	20 & P. Man.	P	Q M	......	......	1	......	......	1	1	......	......
			S	Q M	......	1	1	......	......	......	......	......	......

SKELETON WATCH BILL

FOR A SCREW FRIGATE OF THE FIRST CLASS, ARMED WITH 24 GUNS OF 9-INCH; 14 OF 8-INCH; AND 2 OF 10-INCH.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, idlers.	Bandsmen, idlers.	Firemen.	Coalheavers.	Total.
Forecastlemen	4	1	23	30	12							70
Foremastmen			4									4
Foretopmen	2	2	20	28	10	2						64
Mainmastmen			4									4
Maintopmen	2	2	22	30	10	2						68
Mizzenmastmen				2								2
Mizzentopmen	2	2	8	24	8	4						48
After Guard	2		8	20	84							114
Messenger and Sideboys						12						12
Bandsmen									10			10
Petty Officers							33	14				47
Firemen										24		24
Coalheavers											20	20
Total of each grade	12	7	89	134	124	20	33	14	10	24	20	487

DETAILS OF THE POWDER DIVISION OF A SLOOP OF 14 GUNS.

Stations.	CHAINS OF SCUTTLES.	
	No. 1.	No. 2.
In the passage, to receive and pass charges	1 Cabin Cook.	1 Ward room Cook.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen	1 Officer's Steward.	1 Officer's Steward.
At outside of screen, to receive charges thereat and put them into passing boxes	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—S. W.)
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Yeoman.	1 Ship's Steward.
To pass up full boxes through scuttle on deck	1 Ord. Seaman (A. G.—S. W.)	1 Ord. Seaman (A. G.—P. W.)
On deck, at scuttle, to receive and deliver full boxes to Powderboys	1 Ord. Seaman (Mz.T.—P.W.)	1 Ord. Seaman (Mz.T.—P.W.)
To run with full boxes from screen to passing scuttle, and then back again, with empty boxes	2 Runnerboys.	2 Runnerboys.

The petty officers stationed to receive empty passing boxes and strike them over a fire-tub, aided by those immediately about their respective lines of scuttles, are to see that their canvas shoots, fire-tubs, and wet swabs are in place, and properly prepared for use.

SURGEON'S DIVISION.

The Surgeon, his Assistant, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

MARINES.

Officers, non-commissioned officers, musicians, and privates to be stationed on deck. When required, the marines may be stationed at the great guns, or howitzers. They are to be distributed as the Captain of the ship may direct.

The Paymaster and his Clerk in charge of stores.

SKELETON WATCH BILL

FOR A SCREW FRIGATE OF THE FIRST CLASS, ARMED WITH 24 GUNS OF 9-INCH; 14 OF 8-INCH; AND 2 OF 10-INCH.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, idlers.	Bandsmen, idlers.	Firemen.	Coalheavers.	Total.
Forecastlemen	4	1	23	30	12							70
Foremastmen			4									4
Foretopmen	2	2	20	28	10	2						64
Mainmastmen			4									4
Maintopmen	2	2	22	30	10	2						68
Mizzenmastmen				2								2
Mizzentopmen	2	2	8	24	8	4						48
After Guard	2		8	20	84							114
Messenger and Sideboys						12						12
Bandsmen									10			10
Petty Officers							33	14				47
Firemen										24		24
Coalheavers											20	20
Total of each grade	12	7	89	134	124	20	33	14	10	24	20	487

ENGINE WATCH BILL WHEN UNDER STEAM.

SENIOR FIRST ASSISTANT ENGINEER.]				FIRST WATCH.				[JUNIOR THIRD ASSISTANT ENGINEER.	
Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.	Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	First Relief. 2 4 6 8 Port Watch.		First Relief. 1 3 5 7 Starboard Watch.			First Relief. 26 28 30 32 Port Watch.		First Relief. 25 27 29 31 Starboard Watch.	
JUNIOR FIRST ASSISTANT ENGINEER.]				SECOND WATCH.				[SENIOR THIRD ASSISTANT ENGINEER.	
Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.	Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	Second Relief. 10 12 14 16 Port Watch.		Second Relief. 9 11 13 15 Starboard Watch.			Second Relief. 34 36 38 40 Port Watch.		Second Relief. 33 35 37 39 Starboard Watch.	

ENGINE WATCH BILL WHEN UNDER STEAM—Continued.

SENIOR SECOND ASSISTANT ENGINEER.]				THIRD WATCH.		[JUNIOR SECOND ASSISTANT ENGINEER.			
Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.	Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	Third Relief. 18 20 22 24 Port Watch.		Third Relief. 17 19 21 23 Starboard Watch.			Third Relief. 42 44 46 48 Port Watch.		Third Relief. 41 43 45 47 Starboard Watch.	

QUARTER BILL FOR A SCREW FRIGATE OF THE FIRST CLASS WITH OF OFFICER

QUARTER DECK.—Captain; Executive Officer Aids to Captain

Decks.	No. of guns.	No. of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
					Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
MAIN.	1	16 & P. Man.	S	......	Capt.	1	2	1	......	......	1	1	......
	2	"	P	......	......	1	1	1	Capt.	......	2	1	......
	3	"	S	......	Cox.	1	2	1	......	......	1	1	......
	4	"	P	......	......	1	1	1	......	1	1	1	......
	5	"	S	Q M	......	1	1	1	......	1	2	1	......
	6	"	P	......	Capt.	1	2	1	......	1	1	......	......
	7	"	S	B M	......	1	1	1	......	1	2	......	......
	8	"	P	......	......	1	2	1	......	1	1	1	......
	9	"	S	......	......	1	1	......	Cox.	1	1	1	......
	10	"	P	B M	......	1	1	......	......	1	2	......	......
	11	"	S	......	......	1	2	1	......	1	1	......	......
	12	"	P	Q M	......	1	2	......	......	1	1	......	......
SPARS.	Pivot	20 & P. Man.	P	B M.	......	1	1	1	......	......	2	1	......
			S	......	......	......	1	......	Capt.	1	1	......	......
	1	14 & Boy.	S	......	Capt.	1	1	1	......	1	1	1	......
	2	"	P	......	......	1	1	1	......	1	1	1	......
	3	"	S	......	......	1	1	......	......	1	1	......	......
	4	"	P	......	......	1	2	......	Cox.	1	1	......	......
	5	"	S	......	......	1	1	......	......	1	2	......	......
	6	"	P	......	......	1	1	......	......	1	1	......	......
	7	"	S	......	......	1	1	......	......	1	1	......	......
	Pivot	20 & P. Man.	P	Q M	......	......	1	......	......	1	1	......	......
			S	Q M	......	1	1	......	......	......	......	......	......

40 GUNS, AND A COMPLEMENT OF 487 MEN AND BOYS, EXCLUSIVE AND MARINES.

Master; Passed Midshipmen, as Signal Officer; and Captain's Clerk.

MAINTOPMEN.					MIZZENTOPMEN.					AFTER GUARD.					
Captains of Crowns. Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains of Crowns. Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains of Crowns. Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger Boys.	Officers of divisions.
...	1	2	1	..	...	1	1	1	..	....	.	1	2	.	*1st Division.*
....	1	1	1	..		1	1	1	.	..		1	3		Lieutenant
	1	1	1	..		1	1	1	...	.		1	3	..	Midshipman.
Capt.	1	2	1	.			1	1	..	..		1	3	..	1 Qr. Gunner.
	1	1	1				1	1	..	....		1	3	..	*2d Division.*
	1	2					1		..	...	..	1	5	.	Lieutenant.
.	1	1	1				1	.	.			1	5	.	Midshipman.
..	1	1			Capt.		1					1	5	..	1 Qr. Gunner.
	1	2					1		.	...	.	1	6	.	*3d Division.*
	1	1	1	.			1	..	..	....	.	1	6		Lieutenant
Cox	1	1					1				.	1	6		Midshipman
.	1	2					1		.			1	6		1 Qr. Gunner.
.		1	1	..	.	1	1	1				1			
.	1	1	.	..			1	.					1		*4th Division*
..	1	1	1	..	..		1			..		1	2	1	Lieutenant
.	1	1	1		Cox	.	1	..	..		.	.	2	1	Midshipman
Capt.	1	2	..	.	..		1	..	..	.			5	1	1 Qr. Gunner
..	1	1	..	..			1						5	1	
..	1	1		.	Capt.		1						5	1	*5th Division*
Cox		1					1	1			1	.	4	1	Lieutenant
		1			Cox	1	1	1	.	.		1	4	1	Midshipman
	1	2				1	2	..					5		1 Qr. Gunner
...	..	1	...	.			1	.		Cox.	1	1			

QUARTER BILL FOR A SCREW FRIGATE OF THE FIRST CLASS WITH OF OFFICERS

QUARTER DECK.—Captain; Executive Officer; Aids to Captain;

Decks.	No. of guns.	No. of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
					Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
MAIN.	1	16 & P. Man.	S	......	Capt.	1	2	1	......	......	1	1	......
	2	"	P	......	......	1	1	1	Capt.	......	2	1	......
	3	"	S	......	Cox.	1	2	1	......	......	1	1	......
	4	"	P	......	......	1	1	1	......	1	1	1	......
	5	"	S	Q M	......	1	1	1	......	1	2	1	......
	6	"	P	......	Capt.	1	2	1	......	1	1	......	......
	7	"	S	B M	......	1	1	1	......	1	2	......	......
	8	"	P	......	......	1	2	1	......	1	1	1	......
	9	"	S	......	......	1	1	......	Cox.	1	1	1	......
	10	"	P	B M	......	1	1	......	......	1	2	......	......
	11	"	S	......	......	1	2	1	......	1	1	......	......
	12	"	P	Q M	......	1	2	......	......	1	1	......	......
SPARS.	Pivot	20 & P. Man.	P	B M.	......	1	1	1	......	......	2	1	......
			S	......	......	......	1	......	Capt.	1	1	......	......
	1	14 & Boy.	S	......	Capt.	1	1	1	......	1	1	1	......
	2	"	P	......	......	1	1	1	......	1	1	1	......
	3	"	S	......	......	1	1	......	......	1	1	......	......
	4	"	P	......	......	1	2	......	Cox.	1	1	......	......
	5	"	S	......	......	1	1	......	......	1	2	......	......
	6	"	P	......	......	1	1	......	......	1	1	......	......
	7	"	S	......	......	1	1	......	......	1	1	......	......
	Pivot	20 & P. Man.	P	Q M	......	......	1	......	......	1	1	......	......
			S	Q M	......	1	1	......	......	......	......	......	......

40 GUNS, AND A COMPLEMENT OF 4·7 MEN AND BOYS, EXCLUSIVE AND MARINES.

Master: Passed Midshipmen, as Signal Officer: and Captain's Clerk.

MAINTOPMEN.					MIZZENTOPMEN.					AFTER GUARD.					
Captains or Coxswains Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains or Coxswains Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains or Coxswains Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger Boys.	Officers of divisions.
...	1	2	1	..	...	1	1	1	..	..		1	2	..	*1st Division.*
...	1	1	1	..		1	1	1	..	.		1	3		Lieutenant
	1	1	1	..		1	1	1	...	.		1	3	.	Midshipman.
Capt.	1	2	1	..	.	.	1	1	.	.		1	4	.	1 Qr. Gunner.
	1	1	1	.			1	1	.	..		1	3	..	*2d Division.*
	1	2	.	.			1	..	..	.	..	1	5		Lieutenant.
	1	1	1				1	..	.			1	5	.	Midshipman
	1	1	.	.	Capt.		1			..		1	5		1 Qr. Gunner.
	1	2					1			.		1	6		*3d Division*
	1	1	1				1		..	..		1	6	..	Lieutenant
Cox	1	1					1				.	1	6		Midshipman.
	1	2					1					1	6		1 Qr. Gunner
.		1	1	.		1	1	1				.			
	1	1	.		.		1	.					1		*4th Division*
	1	1	1				1					1	2	1	Lieutenant
	1	1	1		Cox	.	1		.			1	2	1	Midshipman
Capt.	1	2		..	.		1		.				5	1	1 Qr. Gunner.
.	1	1	.	..			1	.	..				5	1	
	1	1		..	Capt.		1		.	.			2	1	
Cox	.	1		.	.		1	1	..		1	.	4	1	*5th Division*
.		1			Cox	1	1	1	.	.		1	4	1	Lieutenant
	1	2				1	2						.		Midshipman
...	..	1	...	..	.	.	1	.		&c.	1	1			1 Qr. Gunner

QUARTER BILL FOR A SCREW FRIGATE, FIRST CLASS, WITH 40 GUNS—Continued.

6TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN.			FORETOPMEN.			MAINTOPMEN.			MIZZENTOPMEN.			AFTER GUARD.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.		Watch.			
Conn	1 Q. M.	S																				
Wheel	1 Q. M.		P	1 Sea.	S					1 Sea.		P				1 Sea.		P				
Signals	1 Q. M.	S											1 Boy		P							
Relieving Tackles	1 Q. M.		P													2 O. S.	S	P				*Quarter Deck.*
Main Braces	1 C. A. G.		P																			Master.
Mizzen Top													2 Sea.	S	P							
Mizzen Mast																			2 O. S.	S	P	
Main Mast	1 B. M.	S																	4 Sea.	S	P	*Forecastle.*
Main Top										2 Sea.	S	P										Boatswain.
Fore Top							2 Sea.	S	P													
Fore Mast																			4 Sea.	S	P	
Forecastle	1 C. F.		P																			
Bell	1 S. C	S																				
Total of each	8	4	4	1	1		2	1	1	3	1	2	3	1	2	3	1	2	10	5	5	30 in all.

QUARTER BILL FOR A SCREW FRIGATE, FIRST CLASS, WITH 40 GUNS—Continued.

7TH, OR POWDER DIVISION. *Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.*

STATIONS.	RATINGS.
In the Forward Magazine	1 Gunner's Mate; 1 Quarter Gunner; 1 Seaman (F. C.—P. W.); 1 Boy (Mizzen Top—S. W.)
In the After Magazine	1 Gunner's Mate; 1 Quarter Gunner; 2 Seamen, (A. G.—1 each W.), 2 Boys (Mizzen Top—1 of each W.)
In and at the Forward Shell room	1 Quarter Gunner; 1 Sailmaker's Mate.
In and at the After Shell room	1 Quarter Gunner; 1 Ship's Corporal.
Receive and whip Shells from Forward Shell room	1 Captain Hold; 4 Firemen; 3 Coalheavers.
Receive and whip Shells from After Shell room	1 Captain Hold; 4 Firemen; 3 Coalheavers.
Pumps	1 Carpenter's Mate
Light Magazines and Shell rooms, and other prescribed places if there be any, and attend to all lights	1 Master at Arms; 1 Ship's Corporal.
Storerooms	1 Yeoman; 1 Coalheaver.
Wings and Force pumps	1 Carpenter's Mate; 1 Cooper.

SUPPLYING POWDER.—SCUTTLES.

The *forward half* of the *main deck guns* are to be supplied from the *starboard* scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No 1.

The *after half* of the *main deck guns* are to be supplied from the *starboard* scuttle of the *after* magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No. 2.

The *spar deck* guns, excepting those on pivot carriages, are to be supplied from the *port* scuttle of the *forward* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No 3.

The *spar deck* guns, on *pivot carriages*, are to be supplied from the *port* scuttle of the *after* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 4.

QUARTER BILL FOR A SCREW FRIGATE, FIRST CLASS, WITH 40 GUNS—Continued.

6th, or Master's Division.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN.			FORETOPMEN.			MAINTOPMEN.			MIZZENTOPMEN.			AFTER GUARD.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.		Watch.			
Conn	1 Q. M.	S																				
Wheel	1 Q. M.		P	1 Sea.	S					1 Sea.		P				1 Sea.		P				
Signals	1 Q. M.	S											1 Boy		P							
Relieving Tackles	1 Q. M.		P													2 O. S.	S	P				*Quarter Deck.*
Main Braces	1 C. A. G.		P																			Master.
Mizzen Top													2 Sea.	S	P							
Mizzen Mast																			2 O. S.	S	P	
Main Mast	1 B. M.	S																	4 Sea.	S	P	*Forecastle.*
Main Top										2 Sea.	S	P										Boatswain.
Fore Top							2 Sea.	S	P													
Fore Mast																			4 Sea.	S	P	
Forecastle	1 C. F.		P																			
Bell	1 S. C.	S																				
Total of each	8	4	4	1	1		2	1	1	3	1	2	3	1	2	3	1	2	10	5	5	30 in all.

QUARTER BILL FOR A SCREW FRIGATE, FIRST CLASS, WITH 40 GUNS—Continued.

7th, or Powder Division. *Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.*

STATIONS.	RATINGS.
In the Forward Magazine	1 Gunner's Mate; 1 Quarter Gunner; 1 Seaman (F. C.—P. W.); 1 Boy (Mizzen Top—S. W.)
In the After Magazine	1 Gunner's Mate; 1 Quarter Gunner; 2 Seamen, (A. G.—1 each W.), 2 Boys (Mizzen Top—1 of each W.)
In and at the Forward Shell room	1 Quarter Gunner; 1 Sailmaker's Mate.
In and at the After Shell room	1 Quarter Gunner; 1 Ship's Corporal.
Receive and whip Shells from Forward Shell room	1 Captain Hold; 4 Firemen; 3 Coalheavers.
Receive and whip Shells from After Shell room	1 Captain Hold; 4 Firemen; 3 Coalheavers.
Pumps	1 Carpenter's Mate
Light Magazines and Shell rooms, and other prescribed places if there be any, and attend to all lights	1 Master at Arms; 1 Ship's Corporal.
Storerooms	1 Yeoman; 1 Coalheaver.
Wings and Force pumps	1 Carpenter's Mate; 1 Cooper.

SUPPLYING POWDER.—Scuttles.

The *forward half* of the *main deck guns* are to be supplied from the *starboard* scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The *after half* of the *main deck guns* are to be supplied from the *starboard* scuttle of the *after* magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No. 2.

The *spar deck* guns, excepting those on pivot carriages, are to be supplied from the *port* scuttle of the *forward* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 3.

The *spar deck* guns, on *pivot carriages*, are to be supplied from the *port* scuttle of the *after* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 4.

QUARTER BILL FOR A SLOOP OF WAR, THIRD CLASS, WITH 14 GUNS—Continued.

4TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORETOPMEN.			MAINTOPMEN.			MIZZENTOPMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M	S											
Wheel	2 Q. M	S	P										*Quarter Deck.*
Relieving Tackles	1 Q. M		P										Master.
Main Braces	1 C. A. G.		P										
Mizzen Top										1 Seaman		P	
Main Mast	1 B. M.	S											
Main Top							2 Seamen	S	P				
Fore Top				2 Seamen	S	P							*Forecastle.*
Forecastle	1 C. F.		P										Boatswain.
Bell	1 S. C	S											
Total of each	8	4	4	2	1	1	2	1	1	1	....	1	13 in all.

QUARTER BILL FOR A SLOOP OF WAR, THIRD CLASS, WITH 14 GUNS—Continued.

5TH, OR POWDER DIVISION.—*Lieutenant, or Passed Midshipman, to command; Sailmaker at Shell and Shot Lockers; Gunner, in the Magazine; and Carpenter at the Pumps.*

STATIONS.	RATINGS.
In the Magazine	1 Gunner's Mate; 1 Quarter Gunner.
In and at Shell room	1 Sailmaker's Mate; 1 Landsman (A. G.—S. W.)
Receive and whip Shells	1 Armorer; 1 Cooper; 1 Landsman (A. G.—P. W.)
Shot lockers	1 Captain Hold; 3 Landsmen (A. G.—2 S. W., and 1 P. W.)
Pumps	1 Ordinary Seaman (A. G.—P. W.) Carpenter's crew.
Light Magazine and Shell room, and other prescribed places, if any, and attend to all lights.	1 Master-at-Arms; 1 Ship's Corporal.

SUPPLYING POWDER.—SCUTTLES.

The 32-pounders *of 27 cwt.* are all to be supplied from the *starboard* scuttle of the magazine, through the other scuttles particularly connected with it, which, together, may be regarded as chain of scuttles No. 1.

The 32-pounders *of 33 cwt.* are to be supplied from the port scuttle of the magazine, through the other scuttles particularly connected with it: which, together, may be regarded as chain of scuttles No. 2.

QUARTER BILL FOR A SLOOP OF WAR, THIRD CLASS, WITH 14 GUNS—Continued.

4th, or Master's Division.

STATIONS.	PETTY OFFICERS.			FORETOPMEN.			MAINTOPMEN.			MIZZENTOPMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M	S											
Wheel	2 Q. M	S	P										*Quarter Deck.*
Relieving Tackles	1 Q. M		P										Master.
Main Braces	1 C. A. G		P										
Mizzen Top										1 Seaman		P	
Main Mast	1 B. M.	S											
Main Top							2 Seamen	S	P				
Fore Top				2 Seamen	S	P							*Forecastle.*
Forecastle	1 C. F.		P										Boatswain.
Bell	1 S. C	S											
Total of each	8	4	4	2	1	1	2	1	1	1	....	1	13 in all.

QUARTER BILL FOR A SLOOP OF WAR, THIRD CLASS, WITH 14 GUNS—Continued.

5th, or Powder Division.—***Lieutenant, or Passed Midshipman, to command; Sailmaker at Shell and Shot Lockers; Gunner, in the Magazine; and Carpenter at the Pumps.***

STATIONS.	RATINGS.
In the Magazine	1 Gunner's Mate; 1 Quarter Gunner.
In and at Shell room	1 Sailmaker's Mate; 1 Landsman (A. G.—S. W.)
Receive and whip Shells	1 Armorer; 1 Cooper; 1 Landsman (A. G.—P. W.)
Shot lockers	1 Captain Hold; 3 Landsmen (A. G.—2 S. W., and 1 P. W.)
Pumps	1 Ordinary Seaman (A. G.—P. W.) Carpenter's crew.
Light Magazine and Shell room, and other prescribed places, if any, and attend to all lights.	1 Master-at-Arms; 1 Ship's Corporal.

SUPPLYING POWDER.—Scuttles.

The 32-pounders *of 27 cwt.* are all to be supplied from the ***starboard*** scuttle of the magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The 32-pounders *of 33 cwt.* are to be supplied from the port scuttle of the magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

DETAILS OF THE POWDER DIVISION OF A SLOOP OF 14 GUNS.

Stations.	CHAINS OF SCUTTLES.	
	No. 1.	No. 2.
In the passage, to receive and pass charges	1 Cabin Cook.	1 Ward room Cook.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen	1 Officer's Steward.	1 Officer's Steward.
At outside of screen, to receive charges thereat and put them into passing boxes	1 Landsman (A. G.—P. W.)	1 Landsman (A. G.—S. W.)
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Yeoman.	1 Ship's Steward.
To pass up full boxes through scuttle on deck	1 Ord. Seaman (A. G.—S. W.)	1 Ord. Seaman (A. G.—P. W.)
On deck, at scuttle, to receive and deliver full boxes to Powderboys	1 Ord. Seaman (Mz.T.—P.W.)	1 Ord. Seaman (Mz.T.—P.W.)
To run with full boxes from screen to passing scuttle, and then back again, with empty boxes	2 Runnerboys.	2 Runnerboys.

The petty officers stationed to receive empty passing boxes and strike them over a fire-tub, aided by those immediately about their respective lines of scuttles, are to see that their canvas shoots, fire-tubs, and wet swabs are in place, and properly prepared for use.

SURGEON'S DIVISION.

The Surgeon, his Assistant, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

MARINES.

Officers, non-commissioned officers, musicians, and privates to be stationed on deck. When required, the marines may be stationed at the great guns, or howitzers. They are to be distributed as the Captain of the ship may direct.

The Paymaster and his Clerk in charge of stores.

SKELETON WATCH BILL

FOR A SCREW FRIGATE OF THE FIRST CLASS, ARMED WITH 24 GUNS OF 9-INCH; 14 OF 8-INCH; AND 2 OF 10-INCH.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, idlers.	Bandsmen, idlers.	Firemen.	Coalheavers.	Total.
Forecastlemen	4	1	23	30	12							70
Foremastmen			4									4
Foretopmen	2	2	20	28	10	2						64
Mainmastmen			4									4
Maintopmen	2	2	22	30	10	2						68
Mizzenmastmen				2								2
Mizzentopmen	2	2	8	24	8	4						48
After Guard	2		8	20	84							114
Messenger and Sideboys						12						12
Bandsmen									10			10
Petty Officers							33	14				47
Firemen										24		24
Coalheavers											20	20
Total of each grade	12	7	89	134	124	20	33	14	10	24	20	487

ENGINE WATCH BILL WHEN UNDER STEAM.

SENIOR FIRST ASSISTANT ENGINEER.] FIRST WATCH. [JUNIOR THIRD ASSISTANT ENGINEER.

Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.		Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	First Relief. 2 4 6 8 Port Watch.		First Relief. 1 3 5 7 Starboard Watch.				First Relief. 26 28 30 32 Port Watch.		First Relief. 25 27 29 31 Starboard Watch.	

JUNIOR FIRST ASSISTANT ENGINEER.] SECOND WATCH. [SENIOR THIRD ASSISTANT ENGINEER.

Hammock or watch number.	Engine number.	Firemen.	Engine number.	Hammock or watch number.		Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	Second Relief. 10 12 14 16 Port Watch.		Second Relief. 9 11 13 15 Starboard Watch.				Second Relief. 34 36 38 40 Port Watch.		Second Relief. 33 35 37 39 Starboard Watch.	

ENGINE WATCH BILL WHEN UNDER STEAM—Continued.

SENIOR SECOND ASSISTANT ENGINEER.]					THIRD WATCH.	[JUNIOR SECOND ASSISTANT ENGINEER.				
Hammock or watch number.	Engine number.	Firemen.	Engine. number.	Hammock or watch number.		Hammock or watch number.	Engine number.	Coalheavers.	Engine number.	Hammock or watch number.
	Third Relief. 18 20 22 24 Port Watch.		Third Relief. 17 19 21 23 Starboard Watch.				Third Relief. 42 44 46 48 Port Watch.		Third Relief. 41 43 45 47 Starboard Watch.	

QUARTER BILL FOR A SCREW FRIGATE OF THE FIRST CLASS WITH
OF OFFICERS

QUARTER DECK.—Captain; Executive Officer;
Aids to Captain;

Decks.	No. of guns.	No. of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
					Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
MAIN.	1	16 & P. Man.	S	......	Capt.	1	2	1	......	......	1	1	......
	2	"	P	......	......	1	1	1	Capt.	......	2	1	......
	3	"	S	......	Cox.	1	2	1	......	......	1	1	......
	4	"	P	......	......	1	1	1	......	1	1	1	......
	5	"	S	Q M	......	1	1	1	......	1	2	1	......
	6	"	P	......	Capt.	1	2	1	......	1	1	......	......
	7	"	S	B M	......	1	1	1	......	1	2	......	......
	8	"	P	......	......	1	2	1	......	1	1	1	......
	9	"	S	......	......	1	1	......	Cox.	1	1	1	......
	10	"	P	B M	......	1	1	......	......	1	2	......	......
	11	"	S	......	......	1	2	1	......	1	1	......	......
	12	"	P	Q M	......	1	2	......	......	1	1	......	......
SPARS.	Pivot	20 & P. Man.	P	B M.	......	1	1	1	......	......	2	1	......
			S	......	......	......	1	......	Capt.	1	1	......	......
	1	14 & Boy.	S	......	Capt.	1	1	1	......	1	1	1	......
	2	"	P	......	......	1	1	1	......	1	1	1	......
	3	"	S	......	......	1	1	......	......	1	1	......	......
	4	"	P	......	......	1	2	......	Cox.	1	1	......	......
	5	"	S	......	......	1	1	......	......	1	2	......	......
	6	"	P	......	......	1	1	......	......	1	1	......	......
	7	"	S	......	......	1	1	......	......	1	1	......	......
	Pivot	20 & P. Man.	P	Q M	......	......	1	......	......	1	1	......	......
			S	Q M	......	1	1	......	......	......	......	......	......

40 GUNS, AND A COMPLEMENT OF 487 MEN AND BOYS, EXCLUSIVE AND MARINES.

Master; Passed Midshipman, as Signal Officer; and Captain's Clerk.

MAINTOPMEN.					MIZZENTOPMEN.					AFTER GUARD.					
Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger Boys.	Officers of divisions.
......	1	2	1	...	......	1	1	1	...	......	...	1	2	....	*1st Division.*
......	1	1	1	...	......	1	1	1	...	......	...	1	3	....	Lieutenant.
......	1	1	1	...	......	1	1	1	...	......	...	1	3	....	Midshipman.
Capt.	1	2	1	...	......	...	1	1	...	......	...	1	3	....	1 Qr. Gunner.
......	1	1	1	...	......	...	1	1	...	......	...	1	3	....	*2d Division.*
......	1	2	...	...	......	...	1	...	...	......	...	1	5	....	Lieutenant.
......	1	1	1	...	......	...	1	...	...	......	...	1	5	....	Midshipman.
......	1	1	...	...	Capt.	...	1	...	...	......	...	1	5	....	1 Qr. Gunner.
......	1	2	...	...	......	...	1	...	...	......	...	1	6	....	*3d Division.*
......	1	1	1	...	......	...	1	...	...	......	...	1	6	....	Lieutenant.
Cox.	1	1	...	...	......	...	1	...	...	......	...	1	6	....	Midshipman.
......	1	2	...	...	......	...	1	...	...	......	...	1	6	....	1 Qr. Gunner.
......	...	1	1	...		1	1	1	...	......	...	1	...	....	*4th Division.*
......	1	1	...	...		....	1	...	...	......	...	...	1	....	Lieutenant.
......	1	1	1	...		....	1	...	...	......	...	1	2	1	Midshipman.
......	1	1	1	...	Cox.	....	1	...	...	......	...	1	2	1	1 Qr. Gunner.
Capt.	1	2	...	...		....	1	...	...	......	...	...	5	1	
......	1	1	...	...		....	1	...	...	......	...	...	5	1	
......	1	1	...	...	Capt.	....	1	...	...	......	...	...	5	1	*5th Division.*
Cox.	...	1	...	...	......	....	1	1	...	......	1	1	4	1	Lieutenant.
......	...	1	...	...	Cox.	1	1	1	...	......	...	1	4	1	Midshipman.
......	1	2	...	...	......	1	2	...	...	......	...	...	3	....	1 Qr. Gunner.
......	....	1	...	...	......	....	1	...	...	C A G	1	1	....	....	

QUARTER BILL FOR A SCREW FRIGATE, FIRST CLASS, WITH 40 GUNS—Continued.

6TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN.			FORETOPMEN.			MAINTOPMEN.			MIZZENTOPMEN.			AFTER GUARD.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.		Watch.			
Conn	1 Q. M.	S																				
Wheel	1 Q. M.		P	1 Sea.	S					1 Sea.		P				1 Sea.		P				
Signals	1 Q. M.	S											1 Boy		P							
Relieving Tackles	1 Q. M.		P													2 O. S.	S	P				*Quarter Deck.*
Main Braces	1 C. A. G.		P																			Master.
Mizzen Top													2 Sea.	S	P							
Mizzen Mast																			2 O. S.	S	P	
Main Mast	1 B. M.	S																	4 Sea.	S	P	*Forecastle.*
Main Top										2 Sea.	S	P										Boatswain.
Fore Top							2 Sea.	S	P													
Fore Mast																			4 Sea.	S	P	
Forecastle	1 C. F.		P																			
Bell	1 S. C.	S																				
Total of each	8	4	4	1	1	...	2	1	1	3	1	2	3	1	2	3	1	2	10	5	5	30 in all.

QUARTER BILL FOR A SCREW FRIGATE, FIRST CLASS, WITH 40 GUNS—Continued.

7th, or Powder Division.—*Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.*

STATIONS.	RATINGS.
In the Forward Magazine	1 Gunner's Mate; 1 Quarter Gunner; 1 Seaman (F. C.—P. W.); 1 Boy (Mizzen Top—S. W)
In the After Magazine	1 Gunner's Mate; 1 Quarter Gunner; 2 Seamen, (A. G.—1 each W), 2 Boys (Mizzen Top—1 of each W)
In and at the Forward Shell room	1 Quarter Gunner; 1 Sailmaker's Mate.
In and at the After Shell room	1 Quarter Gunner; 1 Ship's Corporal.
Receive and whip Shells from Forward Shell room	1 Captain Hold; 4 Firemen; 3 Coalheavers.
Receive and whip Shells from After Shell room	1 Captain Hold; 4 Firemen; 3 Coalheavers.
Pumps	1 Carpenter's Mate
Light Magazines and Shell rooms, and other prescribed places, if there be any, and attend to all lights	1 Master-at-Arms; 1 Ship's Corporal.
Storerooms	1 Yeoman; 1 Coalheaver.
Wings and Force pumps	1 Carpenter's Mate; 1 Cooper.

SUPPLYING POWDER.—Scuttles.

The *forward half* of the *main deck guns* are to be supplied from the *starboard* scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No 1.

The *after half* of the *main deck guns* are to be supplied from the *starboard* scuttle of the *after* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

The *spar deck* guns, excepting those on pivot carriages, are to be supplied from the *port* scuttle of the *forward* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No 3.

The *spar deck* guns, on *pivot carriages*, are to be supplied from the *port* scuttle of the *after* magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 4.

DETAILS OF THE POWDER DIVISION OF A SCREW FRIGATE OF 40 GUNS.

Stations.	CHAINS OF SCUTTLES.			
	No. 1.	No. 2.	No. 3.	No. 4.
In the passage, to receive and pass charges	1 Ward Room Cook.	1 Officer's Steward.	1 Cabin Cook.	1 Officer's Steward.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen.	1 Musician.	1 Musician.	1 Musician.	1 Musician.
At outside of screen, to receive charges thereat and put them into passing boxes	1 Musician.	1 Musician.	1 Musician.	1 Musician.
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Ship's Steward.	1 Qr. Gunner.	1 Qr. Gunner.	1 Qr. Gunner.
To pass up full boxes through scuttle on main deck	1 Musician.	1 Master Band.	1 Musician.	1 Coalheaver.
On main deck, at scuttle, to receive and deliver full boxes to Powdermen.	1 Seaman (A. G.—S. W.)	1 Seaman (A. G.—P. W.)	....	....
On main deck, at scuttle, to receive full boxes, and pass them up through scuttle on spar deck.	....	....	1 Armorer.	1 Painter.
On spar deck, at scuttle, to receive and deliver full boxes to Powdermen and Boys	....	....	1 Seaman (A. G.—S. W.)	1 Armorer's Mate.
To run with full boxes from screen to passing scuttle, and back again with empty boxes.	2 Runnerboys.	2 Runnerboys.	2 Runnerboys.	3 Runnerboys.

Each petty officer stationed to receive empty passing boxes, and strike them over a fire-tub, aided by those immediately about his line of scuttles, is to see that his canvas shoot, fire-tub, and wet swabs are in place, and properly prepared.

QUARTER BILL FOR A SCREW FRIGATE OF THE FIRST CLASS, WITH 40 GUNS—Continued.

8th, or Engineer's Division.—*Chief Engineer; 2 First Assistants; 2 Second Assistants; and 2 Third Assistants.*

ENGINE WATCHES.						WATCH AT ENGINE.		FIRST RELIEF.		SECOND RELIEF.	
PORT.			STARBOARD.			PORT.	STARBOARD.	PORT.	STARBOARD.	PORT.	STARBOARD.
Engine Numbers			Engine Numbers								
1st.	2d	3d	1st.	2d.	3d	Firemen.	Firemen.	Firemen.	Firemen.	Firemen.	Firemen.
2	10	18	1	9	17	Oilers	Oilers	Engine room	Engine room	Receive and whip shells.	Receive and whip shells.
4	12	20	3	11	19	Fire room	Fire room	Donkey pumps.	Donkey pumps	Do.	Do.
6	14	22	5	13	21	Do.	Do.	Fire room	Fire room	Do.	Do.
8	16	24	7	15	23	Do.	Do.	Engine hose	Engine hose.	Do.	Do.
Engine Numbers.											
1st.	2d.	3d	1st	2d.	3d	Coalheavers.	Coalheavers.	Coalheavers	Coalheavers.	Coalheavers.	Coalheavers.
26	34	40	25	33	41	Fire room	Fire room	Fire room	Fire room	Receive and whip-shells.	Receive and whip shells.
28	36	42	27	35	43	Do.	Do.	Engine room	Engine hose	Do	Do
30	38	44	29	37	45	Do.	Do.	Do.	Do	Do	Do.
..	--	46	31	39	..	Do.			Do		Passing scuttle
32	--	..	..	--	--			Store room			

On going to Quarters, *when under steam*, the watch on duty at the Engine will remain there, whilst the First and Second Reliefs will repair to their stations designated in the Quarter Bill When *not under steam*, the First Watch is to be considered the "Watch at Engine," and to repair to that station. The Second Watch then becomes the First Relief, and the Third Watch the Second Relief.

On an alarm of *fire* whilst *under steam*, the "Watch at Engine" will remain there, and attach hose to steam pumps, &c. The First Relief will lead along the hose, pass water buckets, &c ; and the Second Relief will assist in clearing away a passage to the fire, pointing hose, and passing water If *not under steam*, the 1st Engine Watch will repair to the Fire Room, attach the hose to the hand pumps, and man them. The 2d and 3d Watches will perform the duties of the First and Second Reliefs, as above directed, when under steam.

SURGEON'S DIVISION.

The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the cockpit.

CHAPLAIN.

The Chaplain is also stationed in the cockpit.

MARINES.

Officers, non-commissioned officers, musicians, and privates, to be stationed on spar deck. When required, the marines may be stationed at the great guns or howitzers. They are to be distributed as the Captain of the ship may direct.

PAYMASTER.

The Paymaster and his Clerk in charge of stores.

SKELETON WATCH BILL.

FOR THE "LANCASTER," A SCREW STEAMER OF THE SECOND CLASS, ARMED WITH TWO XI-INCH GUNS AND TWENTY IX-INCH GUNS.

STATIONS.	Captains.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, Idlers.	Firemen.	Coalheavers.	Total
Forecastlemen	2	2	16	18	12	..	..	..	..	..	50
Foremastmen	..	..	2	..	..	..	..	..	..	..	2
Foretopmen	2	2	14	18	8	2	..	..	..	..	46
Mainmastmen	..	..	2	..	..	..	..	..	..	..	2
Maintopmen	2	2	14	24	8	..	..	..	..	..	50
Mizzenmastmen	..	..	..	2	..	..	..	..	..	..	2
Mizzentopmen	2	1	6	12	6	2	..	..	..	..	29
After Guard	2	..	6	16	48	..	..	..	..	..	72
Messenger and Sideboys	..	..	..	..	..	6	..	..	..	..	6
Petty Officers	..	..	..	..	..	..	22	12	..	..	34
Firemen	..	..	..	..	..	..	..	..	22	..	22
Coalheavers	..	..	..	..	..	..	..	..	..	18	18
Total of each grade.	10	7	60	90	82	10	22	12	22	18	333

ENGINE WATCH BILL

To be similar in every respect to that given for a Screw Frigate of the 1st class, which see. The only modification necessary is a slight one concerning the number of Firemen and Coalheavers. The Frigate is allowed 24 Firemen and 20 Coalheavers; whereas this vessel is to have but 22 of the former, and 18 of the latter; or 2 less of each of these grades.

QUARTER BILL FOR A SCREW STEAMER OF THE SECOND CLASS, AND A COMPLEMENT OF 333 MEN AND BOYS,

QUARTER DECK.—*Captain; 1st Lieutenant; Master;*

Decks.	No. of gun.	Number of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
					Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
MAIN.	1	16 & P. M.	S	......	Cox...	1	2	1	....	1	2	1	......
	2	"	P	......	....	1	2	1	Capt...	1	2	1	......
	3	"	S	......	....	1	2	1	Capt...	1	2	1	......
	4	"	P	......	Cox...	1	2	1	....	1	2	1	......
	5	"	S	Q M	....	1	2	1	Cox...	1	2	1	......
	6	"	P	......	....	1	1	1	....	1	1	1	......
	7	"	S	......	....	1	2	1	....	1	2	......	......
	8	"	P	B M	....	1	2	1	Cox...	1	2	......	......
	9	"	S	......	....	1	....	1	....	1	......	......	......
	10	"	P	......	....	1	1	1	....	1	1	......	......
SPAR.	Pvt. Fwd.	24 & P. M.	S	......	Capt...	1	1	1	....	1	1	1	......
			P	Q M	....	1	1	1	....	1	1	1	......
	Pvt. Aft.	24 & P. M.	S	B M	....	1	....	....	....	......	......	......	......
			P	......	....	1	....	....	....	......	......	......	......

NOTE.—The "Pensacola" having but one XI-inch Gun, and only 18 IX-inch Guns, requires 42 men less than the "Lancaster" to supply her battery; or 291, exclusive of officers and marines, instead of 333.

The "Brooklyn" having two X-inch Guns, and only 16 IX-inch Guns, also requires just 42 men less than the "Lancaster." Therefore, she and the "Pensacola" require the same number to supply their batteries.

The "Hartford" having 16 IX-inch Guns, and no Pivot Guns, requires 84 men less than the "Lancaster" to supply her battery; or 249, exclusive of officers and marines, instead of 333.

WITH 22 GUNS, VIZ: TWO OF XI-INCH AND TWENTY OF IX-INCH, EXCLUSIVE OF OFFICERS AND MARINES.

Signal Officer; Aid to Captain; and Captain's Clerk.

MAINTOPMEN.					MIZZENTOPMEN.					AFTER GUARD.					
Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Mizzenmastmen. Ordinary Seamen.	Officers of divisions.
....	1	2	1	....	....	....	1	1	....	....	....	1	1	....	*1st Division.* Lieutenant. Midshipman. 1 Quarter Gunner.
....	1	2	1	....	....	....	1	1	....	....	....	1	1	....	
....	1	2	1	....	....	....	1	1	....	....	....	1	1	....	
Capt.	1	2	1	....	....	....	....	1	....	....	....	....	2	....	
....	1	2	1	....	....	....	....	1	....	....	....	....	2	....	
Cox.	1	2	1	....	Capt.	....	1	1	....	....	....	1	2	....	*2d Division.* Lieutenant. Midshipman. 1 Quarter Gunner.
Capt.	1	2	....	....	....	....	1	....	....	....	....	1	4	....	
....	1	....	....	....	....	....	1	....	....	....	....	1	5	....	
Cox.	1	2	....	....	Capt.	....	2	....	....	....	....	2	5	....	
....	1	4	....	....	Cox.	....	1	....	....	....	....	1	4	....	
....	1	1	1	....	....	....	....	....	....	....	....	1	1	....	*3d Division.* Lieutenant. Midshipman. Midshipman. 1 Quarter Gunner.
....	....	1	1	....	....	....	1	....	....	....	1	1	1	....	
....	....	1	....	....	....	2	1	....	....	....	....	2	4	1	
....	....	1	....	....	....	2	1	....	....	Capt.	....	2	3	1	

The "Richmond," having 14 IX-inch Guns and no Pivot Guns, requires 101 men less than the "Lancaster" to supply her battery; or 232, exclusive of officers and marines, instead of 333. If desirable the number of men for both this vessel and the "Hartford" may undergo a further reduction of seven men and two boys; for, as neither has any guns on the spar deck to be supplied with powder, the chain of scuttles No. 3 in their case is unnecessary.

It may be also that all four of these vessels can do with four less Firemen than the "Lancaster." In each of the above cases it is assumed that the number of Petty Officers will be 51, or the same as that of the "Lancaster."

QUARTER BILL FOR A SCREW STEAMER OF THE SECOND CLASS, 22 GUNS—Continued.

4TH, OR MASTER'S DIVISION.

STATIONS.	PETTY OFFICERS.			FORECASTLEMEN			FORETOPMEN.			MAINTOPMEN.			MIZENTOPMEN.			AFTER GUARD.			MASTMEN.			OFFICERS.
		Watch.			Watch.			Watch.			Watch.			Watch.			Watch.			Watch.		
Conn	1 Q. M.	S.																				
Wheel	1 Q. M.		P.	1 Sea.	S.					1 Sea.		P.				1 Sea.	S.					
Signals	1 Q. M.	S.											1 Boy.		P.							*Quarter Deck.*
Relieving Tackles	1 Q. M.		P.													1 O. S.		P.				Master.
Main Braces	1 C. A. G	S.																				
Mizen Top													2 Sea.	S.	P.							
Main Mast	1 B. M.	S.																	2 Sea.	S.	P.	*Forecastle.*
Main Top										2 Sea.	S.	P.										Boatswain.
Fore Top							2 Sea.	S.	P.													
Fore Mast																			2 Sea.	S.	P.	
Forecastle	1 C. F.		P.																			
Bell	1 S. C.		P.																			
Total of each	8	4	4	1	1		2	1	1	3	1	2	3	1	2	2	1	1	4	2	2	23 in all.

QUARTER BILL FOR A SCREW STEAMER OF THE SECOND CLASS, 22 GUNS—Continued.

8TH, OR POWDER DIVISION.—*Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.*

Stations.	Ratings.
In the Forward Magazine	2 Quarter Gunners; 1 Seaman (F. C.—P. W.); 1 Boy (Mizzen Top—S. W.)
In the After Magazine	1 Gunner's Mate; 1 Quarter Gunner; 2 Seamen (A. W.—1 in each W.); 2 Boys (F. top—1 of each W.)
In and at the Forward Shell room	1 Sailmaker's Mate; 1 Painter.
In and at the After Shell room	1 Armorer; 1 Ship's Corporal.
Receive and whip shells from Forward Shell room	1 Captain of Hold; 4 Firemen; 3 Coalheavers.
Receive and whip shells from After Shell room	4 Firemen; 3 Coalheavers.
Pumps	1 Carpenter's Mate.
Light Magazines, Shell rooms, and other prescribed places, if there be any, and attend to all lights	1 Master-at-Arms; 1 Ship's Corporal.
Store rooms	1 Yeoman; 1 Coalheaver.
Wings and Force pumps	1 Cooper; 1 Armorer's Mate.

SUPPLYING POWDER.—SCUTTLES.

The *forward* half of the *main deck guns* are to be supplied from the starboard scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The after half of the *main deck guns* are to be supplied from the scuttle of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

Both *pivot guns* on the spar deck are to be supplied from the *port* scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 3.

DETAILS OF THE POWDER DIVISION

Stations.
In the passage, to receive and pass charges..................................
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen.
At outside of screen, to receive charges thereat and put them into passing boxes..
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire-tub, and then deliver them to Runnerboys.
To pass up full boxes through scuttle on main deck ....
On main deck, at scuttle, to receive and deliver full boxes to Powdermen........
On main deck, at scuttle, to receive full boxes and pass them up through scuttle on spar deck.
On spar deck, at scuttle, to receive and deliver full boxes to Powdermen.........
To run with full boxes from screen to passing scuttle, and then back again with empty boxes.

N. B —The after magazine of the *Lancaster*, like that of our propellers generally, consists of two separate compartments, with the alley-way of the propeller shaft between them: and hence the reason why one more Seaman and one more Boy are detailed for it than the other. If, however, only one of the compartments is to be used at a time, (and no more need be by the above arrangements,) then the Sea-

OF A SCREW STEAMER, 22 GUNS.

CHAINS OF SCUTTLES.

No. 1.	No. 2.	No. 3.
1 Ward Room Cook.	1 Officer's Steward.	1 Cabin Cook.
1 Lands. (A. G.—S. W.)	1 Lands. (A. G.—P. W.)	1 Lands. (A. G.—S. W.)
1 Lands. (A. G —P. W.)	1 Officer's Steward.	1 Lands. (A. G.—P. W.)
1 Ship's Steward.	1 Seaman (A. G.—S. W.)	1 Seaman (A. G.—P. W.)
1 Lands. (A. G.—S. W.)	1 Lands. (A. G.—S. W.)	1 Lands. (A. G.—S. W.)
1 Lands. (A. G.—P. W.)	1 Lands. (A. G.—P. W.)	
		1 Lands. (A. G.—P. W.)
		1 Lands. (A. G.—S. W.)
2 Runnerboys.	2 Runnerboys.	2 Runnerboys.

man and Boy in question may be assigned to service elsewhere—to take the places, for instance, of any of the Powder Division who may happen to be sick.

Each man stationed to receive empty passing boxes and strike them over a fire-tub, aided by those immediately about his line of scuttles, is to see that his canvas shoot, fire-tub, and wet swabs are in place and properly prepared.

6TH, OR ENGINEER'S DIVISION.

To be similar, in every respect, to that given for a Screw Frigate of the 1st class, (which see,) only a reduction is to be made in the number of Firemen and Coalheavers of two each.

SURGEON'S DIVISION.

The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

CHAPLAIN.

The Chaplain's station is also in the apartment to receive the wounded.

MARINES.

Officers, non-commissioned officers, musicians, and privates to be stationed on the spar deck. When required, the marines may be stationed at the great guns or howitzers. They are to be distributed as the Captain of the ship may direct.

PURSER.

The Pursur and his Clerk in charge of stores.

SKELETON WATCH BILL

FOR A SCREW STEAMER OF THE THIRD CLASS—"MOHICAN," "IROQUOIS," "WYOMING" AND "DACOTAH"—ARMED WITH TWO XI-INCH GUNS AND FOUR 32-PDRS. OF 57 CWT. EACH.

Stations.	Captains.	Coxswains.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Other Petty Officers to keep watch.	Petty Officers, Idlers.	Firemen.	Coalheavers.	Total.
Forcastlemen	1	1	5	4	1	....	....	....	....	....	12
Foremastmen	....	....	....	2	....	....	....	....	....	....	2
Foretopmen	1	1	4	4	2	....	....	....	....	....	12
Mainmastmen	....	....	2	....	....	....	....	....	....	....	2
Maintopmen	1	1	5	4	1	....	....	....	....	....	12
After Guard	2	....	....	6	10	....	....	....	....	....	18
Messenger and Sideboys.	....	....	....	....	....	4	....	....	....	....	4
Petty Officers	....	....	....	....	....	....	11	9	....	....	20
Firemen	....	....	....	....	....	....	....	....	14	....	14
Coalheavers	....	....	....	....	....	....	....	....	....	14	14
Total of each grade..	5	3	16	20	14	4	11	9	14	14	110

ENGINE WATCH BILL.

To be similar, in every respect, to those already mentioned, reducing the number of Firemen and Coalheavers so as to correspond with the above allowance.

QUARTER BILL FOR A SCREW STEAMER OF THE THIRD CLASS, WITH SIX COMPLEMENT OF 110 MEN AND BOYS,

Quarter deck.—Commander ; *First*

Number of gun.	Number of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.			
				Capt's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Capt's or Coxsw'ns, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.
Pivot ..	24 & P. M..	S...	......	Capt.	1	1	....	......	1	1	1
Forward		P ..	......	Cox..	1	1	....	......	1	1	1
1......	12 & P. B..	S...	Q. M.	......	1	1	....	Capt.	1	....	....
2......	12 & P. B..	P...	Q. M.	......	....	1	....	......	1	....	....
Pivot ..	24 & P. M..	S...	Q M.	......	1	....	....	......	....	1	....
Aft....		P ..	B. M.	......	1	....	1	......	....	1	....

NOTE.—The "Narragansett," having but one XI-inch gun and four 32-pounders of 42 cwt., requires 29 men less at her guns than the "Mohican," "Iroquois," "Wyoming," and "Dacotah."

The "Seminole," having but one XI-inch gun and two 32-pounders of 57 cwt.,

GUNS, VIZ: TWO XI-INCH AND FOUR 32-POUNDERS OF 57 CWT., AND A EXCLUSIVE OF OFFICERS AND MARINES.

Lieutenant; Master; and Captain's Clerk.

MAINTOPMEN.				AFTER GUARD.									
Capt's or Coxsw'ns, Captains of guns.	Seamen	Ordinary Seamen.	Landsmen.	Captains.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger Boys.	Mastmen.	Coalheavers	Marines.	Petty officers at the guns, but not as Captains.	Officers of divisions
......	1	1	..	......	..	..	2	..	1 O. S	..	..	S. M. Mate....	*1st Division.* Lieutenant. Midshipman. 1 Qr. Gunner.
......	..	1	..	......	..	..	2	..	1 O. S	..	1	Arm. & S. Ck..	
......	..	..	..	......	..	1	1	1	1 Sea	1	2	O. Cook	
Capt.	1	..	..	......	..	1	1	1	1 Sea	1	2	O. Cook	*2d Division.* Lieutenant. Midshipman. 1 Qr. Gunner.
......	1	1	1	Capt.	..	2	2	..	......	..	1	Cox. M. Top...	
......	1	1	..	Capt.	..	2	2	..	......	..	..	Cox. F. Top ...	

requires 38 men less at her guns than the vessels just mentioned, unless the intention be that she is to fight both of her 32-pounders on one side at the same time, and then she will require only 25 men less than those vessels at her guns.

QUARTER BILL FOR A SCREW STEAMER OF THE THIRD CLASS, 6 GUNS—Continued.

3d, or Master's Division.

Stations.	Ratings.
At the Wheel	1 Quartermaster; 1 Seaman, (M. T —P. W.)
On the Forecastle	1 Boatswain's Mate, (S. W)

4th, or Powder Division.—*Passed Midshipman, or Midshipman, to command; Gunner, in the Magazine; and Carpenter, at the Pumps.*

Stations.	Ratings.
In the Magazine	1 Gunner's Mate.
In and at Shell room	1 Yeoman; 1 Fireman.
Receive and whip shells and pass up shot	1 Captain of Hold; 1 Fireman; 2 Coalheavers.
Light Magazine and Shell room, and elsewhere, if prescribed, and attend all lights	1 Master-at-Arms.

SUPPLYING POWDER.—Scuttles.

The number of guns to be supplied being few, the difference in the form and dimensions of charges for a XI-inch and a 32-pounder too great to admit of mistaking one for the other, and the number of men to man the guns themselves large in proportion to that of the whole crew allowed, only one chain of scuttles is to be established. The scuttle on deck, up through which the powder is to be passed for all the guns, and the one alongside of it for returning empty boxes, should be as nearly midway between the pivot guns as practicable; and, of course, large enough to receive the larger passing boxes.

DETAILS OF THE POWDER DIVISION OF A SCREW STEAMER OF 6 GUNS.

Stations.	Chain of Scuttles
In the passage to receive and pass charges	1 Fireman.
At passage scuttle to receive charges thereat and pass them to the screen	1 Officer's Steward.
At outside of screen to receive charges thereat and put them into passing boxes	1 Officer's Steward.
At lower extremity of canvas shoot to receive empty boxes, strike them over fire-tub, and then deliver them to Runnerboys.	1 Fireman.
To pass up full boxes through scuttle on deck	1 Coalheaver.
On deck, at scuttle, to receive and deliver full boxes to Powdermen and Boys	1 Coalheaver.
To run with full boxes from screen to passing scuttle, and then back again with empty boxes	2 Runnerboys.

The Fireman stationed to receive empty passing boxes and strike them over a fire-tub, aided by those immediately about his line of scuttles, is to see that his canvas shoot, fire-tub, and wet swabs are in place and properly prepared.

5TH, OR ENGINEERS DIVISION.

To be similarly arranged to those already mentioned, reducing, however, the number of Firemen and Coalheavers so as to correspond with that allowed for this class of vessel, and modifying it a little so as to quarter some of the Firemen and Coalheavers, as directed above, in the Powder Division.

SURGEON'S DIVISION.

The Medical Officers and the Surgeon's Steward are to constitute this division, and their station is to be in the apartment to receive the wounded

MARINES.

They are to be distributed as the Captain of the vessel may direct. Their services in action will probably be most needed at the great guns.

PURSER.

The Purser and his Clerk in charge of stores.

SKELETON WATCH BILL.

FOR A SIDE-WHEEL STEAMER, FIRST CLASS—"SUSQUEHANNA"—ARMED WITH THREE 64-PDRS. (PIVOTS) OF 106 CWT., AND TWELVE 8-INCH (BROADSIDE) OF 63 CWT.

Stations.	Captains.	Coxswain.	Seamen.	Ordinary seamen.	Landsmen.	Boys.	Other petty officers to keep watch.	Petty officers, idlers.	Bandsmen, idlers.	Firemen.	Coalheavers.	Total.
Forecastlemen	2	2	8	14	4							30
Foremastmen				2								2
Foretopmen	2	2	8	10	2	2						26
Mainmastmen			2									2
Maintopmen	2	2	8	10	2	4						28
After Guard	2	1	3	9	27							42
Messenger & Sideboys.						6						6
Bandsmen.									9			9
Petty Officers.							20	13				33
Firemen										24		24
Coalheavers											22	22
Total of each grade	8	7	29	45	35	12	20	13	9	24	22	224

ENGINE WATCH BILL.

When under steam to be similar to that given for a screw Frigate of the first class, which see.

QUARTER BILL FOR A SIDE-WHEEL STEAMER OF THE FIRST CLASS— AND BOYS, EXCLUSIVE OF

QUARTER DECK.—*Captain; Executive Officer; Master;*

No. of gun.	Number of men.	Watch to which gun's crew belongs.	Petty Officers, Captains of guns.	FORECASTLEMEN.				FORETOPMEN.				
				Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.
No. 1 Pivot Forward	18 and P. Man	S		Capt	1	2	1					
		P		Cox	1	2	1		1			
No. 2 Pivot Forward	18 and P. Man	S		Cox	1	1	1		1	1		
		P		Capt	1	1	1		1	1		
BROADSIDE. 1	14 and P. Boy	S			1	1		Capt		1	1	
2	“	P	B. M		1	1				1	1	
3	“	S				1		Cox	1	1		
4	“	P				1		Capt	1	1		
5	“	S	Q. G			1			1	1		
6	“	P				1		Cox	1	1		
No. 3 Pivot Aft	12 and P. Man	S	B. M.		1	1				1		
		P	Q. G		1	1				1		

NOTE.—The "Powhatan," with her intended armament of *two* XI-inch and *ten* IX-inch Guns, can do very well with the same number and description of men as the "Susquehanna" with her battery of three 64-pounder pivots and twelve 8-inch of 63 cwt. The slight difference involved is in favor of the "Powhatan."

The "Mississippi," as far as guns only are concerned, can do with fifty men less than either of the above; and

The "Saranac" also, as far as guns only are concerned, with seventy men less; the former having

"SUSQUEHANNA"—WITH 15 GUNS, AND A COMPLEMENT OF 224 MEN OFFICERS AND MARINES.

Signal Officer; Aid to Captain; and Captain's Clerk,

MAINTOPMEN.					AFTER GUARD.										
Captains or Coxswains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Boys.	Captains, Captains of guns.	Seamen.	Ordinary Seamen.	Landsmen.	Messenger and Sideboys.	Firemen.	Coalheavers.	Petty Officers stationed at guns, but *not* as Captains.	Mastmen.	Officers of Divisions.	
	1	1						2					1 O. S. F. M.	*1st Division.*	But *two* Quarter Gunners can be spared for the divisions of guns, therefore one must attend to the 1st and 2d divisions and the other to the 3d and 4th.
		1						1				Armorer		Lieutenant.	
		1						1				Sh. Cook		Midshipm'n.	
		1					1	1					1 O. S. F. M.		
Cox		1				1	1	3	1	1		Off. Cook		*2d Division.*	
		1			Capt	1	1	3	1		1	Off. Cook		Lieutenant.	
Capt	1		1				1	4	1		1	Ar. Mate		Midshipm'n.	
Cox	1		1				1	3	1	1	1		1 Sea. M. M.	*3d Division.*	
	1	1			Capt		1	3	1	1	1		1 Sea. M. M.	Lieutenant.	
Capt	1	1					1	3	1	1	1	Painter		Midshipm'n.	
	1	1					1	1				Cox (A. G.)		*4th Division.*	
	1	1					1	2				S. M. Mate		Lieut.—Mid.	

a battery of one X-inch of 12,000 pounds and ten 8-inch of 63 cwt., and the latter a battery of one 64-pounder of 106 cwt. and eight 8-inch of 55 cwt.

The "San Jacinto" and the "Saranac" are now, by regulations, manned precisely alike, although the former has a battery of *one* 64-pounder of 106 cwt., *ten* 8-inch of 55 cwt., and *two* 32-pounders of 57 cwt. As far, therefore, as guns only are concerned, the "Saranac" requires 26 more men and boys. The tonnage of the two vessels, however, is, by the Naval Register, exactly the same.

QUARTER BILL FOR A SIDE-WHEEL STEAMER, FIRST CLASS, 15 GUNS—Continued.

MASTER'S OR 5TH DIVISION.

Stations.	Ratings.	Officers.
Wheel	2 Q. M. (1 of each watch) and 1 Seaman (A. G.—S. W.)	*Quarter Deck.*
Relieving Tackles	2 Q. M. (1 of each watch.)	Master.
Mainmast	1 B. M. (S. W.)	
Foretop	1 Seaman (S. W.)	*Forecastle.*
Maintop	1 Seaman (P. W.)	Boatswain.

6TH, OR POWDER DIVISION.—*Lieutenant, or Passed Midshipman, to command; Sailmaker, at Shell Lockers; Gunner, in the Fore Magazine; and Carpenter, at the Pumps.*

Stations.	Ratings.
In the Forward Magazine	1 Gunner's Mate; 1 Yeoman.
In the After Magazine	1 Gunner's Mate; 1 Cooper.
In and at the Forward Shell room	1 Fireman; 1 Coalheaver.
In and at the After Shell room or Shot locker	1 Fireman; 1 Ship's Steward.
Receive and whip Shells from Forward Shell room	1 Captain Hold; 2 Firemen; 2 Coalheavers.
Receive and whip Shells from After Shell room or Shot locker	1 Captain Hold; 2 Firemen; 2 Coalheavers.
Pumps	1 Carpenter's Mate.
Light Magazines and Shell rooms, and other prescribed places, if any, and attend to all lights	1 Master-at-Arms; 1 Ship's Corporal.
Wings and Force pumps	1 Carpenter's Mate.

SUPPLYING POWDER.—SCUTTLES.

The 8-inch guns are to be supplied from the scuttle of the forward magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 1.

The pivot guns are to be supplied from the scuttle of the after magazine, through the other scuttles particularly connected with it; which, together, may be regarded as chain of scuttles No. 2.

DETAILS OF THE POWDER DIVISION FOR A SIDE-WHEEL STEAMER, FIRST CLASS, OF 15 GUNS.

Stations.	Chains of scuttles.	
	No. 1.	No. 2.
In the passage to receive and pass charges	1 Musician.	1 Musician.
At passage scuttle on orlop deck, to receive charges thereat and pass them to the screen	1 Musician	1 Musician.
At outside of screen, to receive charges thereat and put them into passing boxes	1 Musician.	1 Cabin Steward.
At lower extremity of canvas shoot, to receive empty passing boxes, strike them over fire tub, and then deliver them to Runnerboys.	1 Master Band.	1 W. R. Steward.
To pass up full boxes through scuttle on deck	1 Musician.	1 Musician.
On deck, at scuttle, to receive and deliver full boxes to Powdermen and Boys	1 Musician.	1 Musician.
To run with full boxes from screen to passing scuttle, and back again with empty boxes	3 Runnerboys.	3 Runnerboys.

Each person stationed to receive empty passing boxes and strike them over the fire-tubs, aided by those immediately about his line of scuttles, is to see that his canvas shoots, fire-tubs, and wet swabs are in place and properly prepared.

7TH, OR ENGINEER'S DIVISION.

To be similar to that given for a Screw Frigate of the first class, (which see,) but modified so as to correspond with the several stations assigned to Firemen and Coalheavers, as expressed above.

SURGEON'S DIVISION.

The Surgeon, his Assistants, and Steward, are to constitute this division, and their station is to be in the apartment to receive the wounded.

CHAPLAIN.

The Chaplain's station is also in the apartment to receive the wounded.

MARINES.

Officers, non-commissioned officers, musicians, and privates, to be stationed on deck. When required, the marines may be stationed at the great guns, or howitzers. They are to be distributed as the Captain of the ship may direct.

PURSER.

The Purser and his Clerk in charge of stores.

APPENDIX B.—No. I.

GRADUATION OF SIGHTS AND MEAN RANGES

OF

UNITED STATES NAVAL GUNS.

(*From Results of Practice, by Admiral* DAHLGREN, *United States Navy.*)

The graduation commences from the bottom of the head of the bar resting on the sight-box.

The aim is supposed to be taken at the water-line of a ship.

		32-POUNDER OF 27 CWT.		32-POUNDER OF 33 CWT.	
Charge		4 lbs.		4½ lbs.	
Axis of bore above load line		7 feet.		7½ feet.	
Distance between sights		Old model. 29¼ inches.	New model. 26⅝ inches.	31 inches.	
Elevation.	**Range.**	**Graduation.**	**Graduation.**	**Range.**	**Graduation.**
Degrees.	Yards.	Inches.	Inches.	Yards.	Inches.
Level.	250	0.353	0.324	287	0.350
1°	545	0.746	0.684	581	0.792
2°	800	1.266	1.161	857	1.343
3°	1,047	1.891	1.652	1,140	1.909
4°	1,273	2.337	2.144	1,398	2.478
5°	1,469	2.870	2.633	1,598	3.044
6°	1,637	3.398	3.116	....	....

APPENDIX B.—No. II.

		32-POUNDER OF 42 CWT.		32-POUNDER OF 57 CWT.	
Charge		6 lbs.		9 lbs.	
Axis of bore above load line		7½ feet.		8 feet.	
Distance between sights		Old model. 40.5 inches.	New model. 37.1 inches.	42.5 inches.	
Elevation.	Range.	Graduation.	Graduation.	Range.	Graduation.
Degrees.	Yards.	Inches.	Inches.	Yards.	Inches.
Level.	313	0.446	0.408	360	0.412
1°	672	1.016	0.931	760	1.042
2°	988	1.742	1.596	1,150	1.808
3°	1,274	2.488	2.280	1,440	2.597
4°	1,505	3.235	2.964	1,710	3.384
5°	1,756	3.974	3.641	1,930	4.162
6°	....	....	....	2,140	4.930

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR. Classes. Razees.					BRIGS.	STEAMERS. Screw. Classes.				Side-wheel. Classes.			
					1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	321	333	110	61	224	187	75	50
***Howitzers, Equipments, and Implements*—Continued.**																		
HAVERSACKS	No.	1																
HOWITZER	No.	....	As may be ordered.															
" Boat Carriage	No.	1																
" Field Carriage	No.	1																
LADLES	No.	1																
LOCKS for Howitzers	No.	2																
LOCK LANYARDS	No.	3																
LOCK TOGGLES	No.	2																
LOOP PINS	No.	2																
PIVOT BOLTS	No.	2																
PRIMING WIRES	No.	2																
PRIMERS for Howitzers	No.	250																
RAMMERS and SPONGES, connected	No.	2																
SHIFTING SPAR	No.	....	One to each class of howitzers.															
SIGHTS for Howitzers, long and short	No.	2																
SIGHT, Thumbscrews	No.	2																
SCREWDRIVERS for Fuzes for Rifle Howitzers	No.	1																
TACKLES for Broadside 24-pounders	set.	1																
TOMPIONS, with wads and lanyards	No.	$1\frac{1}{10}$																

APPENDIX B.—No. II.

		32-POUNDER OF 42 CWT.		32-POUNDER OF 57 CWT.	
Charge		6 lbs.		9 lbs.	
Axis of bore above load line		7½ feet.		8 feet.	
Distance between sights		Old model. 40.5 inches.	New model. 37.1 inches.	42.5 inches.	
Elevation.	Range.	Graduation.	Graduation.	Range.	Graduation.
Degrees.	Yards.	Inches.	Inches.	Yards.	Inches.
Level.	313	0.446	0.408	360	0.412
1°	672	1.016	0.931	760	1.042
2°	988	1.742	1.596	1,150	1.808
3°	1,274	2.488	2.280	1,440	2.597
4°	1,505	3.235	2.964	1,710	3.384
5°	1,756	3.974	3.641	1,930	4.162
6°	....	....	....	2,140	4.930

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR. Classes. Razees. 1st.	2d.	1st.	2d.	3d.	BRIGS.	STEAMERS. Screw. Classes. 1st.	2d.	3d.	4th.	Side-wheel. Classes. 1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	321	333	110	61	224	187	75	50
***Howitzers, Equipments, and Implements*—Continued.**																		
HAVERSACKS	No.	1																
HOWITZER	No.	....	As may be ordered.															
" Boat Carriage	No.	1																
" Field Carriage	No.	1																
LADLES	No.	1																
LOCKS for Howitzers	No.	2																
LOCK LANYARDS	No.	3																
LOCK TOGGLES	No.	2																
LOOP PINS	No.	2																
PIVOT BOLTS	No.	2																
PRIMING WIRES	No.	2																
PRIMERS for Howitzers	No.	250																
RAMMERS and SPONGES, connected	No.	2																
SHIFTING SPAR	No.	....	One to each class of howitzers.															
SIGHTS for Howitzers, long and short	No.	2																
SIGHT, Thumbscrews	No.	2																
SCREWDRIVERS for Fuzes for Rifle Howitzers	No.	1																
TACKLES for Broadside 24-pounders	set.	1																
TOMPIONS, with wads and lanyards	No.	$1\frac{1}{10}$																

APPENDIX B.—No. IV.

	IX-INCH SHELL GUN.		XI-INCH SHELL GUN.		XI-INCH SHELL GUN.	
Charge.......	10 lbs.		15 lbs.		15 lbs.	
Shell..........	72 lbs.		135 lbs.		135 lbs.	
Axis of bore above load line.......	10 feet.		10 feet.		20 feet.	
			[Screw sloops.]		[2d deck above water.]	
Distance between sights	39 inches.		48 inches.		48 inches.	
Elevation.	Range.	Graduation.	Range.	Graduation.	Range.	Graduation.
Degrees.	Yards.	Inches.	Yards.	Inches.	Yards.	Inches.
Level.	340	0.461	306	0.660	420	0.87
....	700	0.983	500	0.945	700	1.48
....	900	1.514	700	1.442	900	2.01
....	1,100	2.073	900	2.040	1,100	2.62
....	1,300	2.646	1,100	2.651	1,300	3.25
....	1,500	3.222	1,300	3.295	1,500	4.92
....	1,700	3.813	1,500	3.953	....	....
....	....	....	1,700	4.681	....	....

APPENDIX B.—No. V.—*Approximate ranges of shell guns.*

Class of gun.	Kind of projectile.	Weight of projectile.	Charge, lbs.	Height above plane.	ELEVATION IN DEGREES.—RANGES IN YARDS.—TIME OF FLIGHT IN SECONDS.															
					P.B. or 0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°
XV-in..	Cored shot.	400	....	....	....	....	....	......	......	......	......	......	......	......	......	......	......	......	......	......
	Shell	350	35	....	300	620	920 1.9	1,200 3.7	1,470 4.3	1,700 5.7	1,900 6.5	2,100 7.7	......	......	......	......	......	......	......	......
XI-inch	Shell	136	15	10	306 .84	631 1.72	918 2.8	1,208 3.88	1,472 4.9	1,712 5.81	1,914 6.74	2,105	2,300	2,500	2,687 10.2	2,870 11.70	3,022 12.15	3,160	3,300	3,440
	Shell	136	15	20	421 1.16	679 1.96	992 3	1,257 3.94	1 524 4.99	1,757 6.04	1,950	2,140	......	......	......	......	......	......	......	......
	Shell	136	20	10	....	....	....	......	......	......	......	2,510 8.6	2,700	2,890 10.2	3,030	3,170 11.8	3,310	3,438 14	3,550	3,653 16.5
	Shrapnel...	141	15	10	295 .8	620 1.7	910 2.7	1,200 3.7	1,465 4.7	1,710 5.6	......	......	......	......	......	......	......	......	......	......
X-inch	Shell	103	12½	11	340	705 2	970 2.9	1,230 3.9	1,490 4.9	1,740 5.8	1,960 6.7	2,210	2,430 8.5	2,640	2,840 10.1	3,000	......	......	......	......
	Shrapnel...	101	....	....	....	....	....	......	......	......	......	......	......	......	......	......	......	......	......	......
IX-inch	Shell	72½	10	10½	332 .9	718 1.96	962 3	1,218 4	1,471 5.1	1,710 5.96	1,933	2,133 8	2,314	2,484 8.6	2,644 11.5	2,788 12.9	2,927	3,245 13.5	3,190	3,357 14.7
	Shell	....	13	....	....	....	....	......	......	......	......	......	......	......	......	......	......	......	......	......
	Shrapnel...	75	10	....	332 .8	718 1.9	960 2.9	1,215 4	1,470 5	1,690 5.9	......	......	......	......	......	......	......	......	......	......
8-inch, 63-cwt.	Shell	51½	9	8	330	660 1.89	970 3.07	1,260 4.34	1,540 5.32	1,770 6.32	......	......	......	......	......	......	......	......	......	......
	Shrapnel...	52	....	....	340 .9	670 1.8	980 3	1,270 4.2	1,550 5.2	1,775 6.2	......	......	......	......	......	......	......	......	......	......
8-inch, 55-cwt.	Shell	51½	7	7½	283	579 1.7	869 2.9	1,148	1,413	1,657	1,866	......	2,315	......	2,600	......	......	......	......	......
	Shrapnel...	52	....	....	290 .8	590 1.6	880 2.8	1,160 3.9	1,420 4.9	1,660 5.8	......	......	......	......	......	......	......	......	......	......

APPENDIX B.—No. VI.—*Approximate ranges of shot guns and howitzers.*

Class of gun.	Kind of projectile.	Wg't of proj'le.	Charge.	Height above plane	ELEVATION IN DEGREES.—RANGES IN YARDS.—TIME OF FLIGHT IN SECONDS.															
					P.B or 0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°
32-pounder of 57 cwt.	Shot	32	9	8	360	760 2.2	1,150 3.4	1,440 4.3	1,710 5.3	1,930 6.6	2,140 7.7	2,310	2,460	2,610	2,731 10.7	....	....	....	....	....
	Shell	26	6	....	....	800 2.2	1,100 3.3	1,350 4.2	1,570 5	1,760 6	....	....	....	....	....	....	....	....	....	....
	Shrapnel	32	....	....	360	760 2.2	1,150 3.4	1,440 4.3	1,710 5.3	1,930 6.6	....	....	....	....	....	....	....	....	....	....
32-pounder of 42 cwt.	Shot	32	6	8½	313	672	988	1,274	1,505	1,756	....	....	....	....	....	....	....	....	....	....
	Shell	26	6	....	330 .7	700 1.8	1,020 2.9	1,300 4.2	1,500 5.1	1,750 6.2	....	....	....	....	....	....	....	....	....	....
	Shrapnel	32	....	....	313 .8	672 1.8	988 2.8	1,274 3.8	1,505 4.8	1,756 5.8	....	....	....	....	....	....	....	....	....	....
32-pounder of 33 cwt.	Shot	32	4½	7½	287	581	857	1,140	1,398	1,598	....	....	....	....	....	....	....	....	....	....
	Shot	32	4½	15⅛	366 1.1	655 2	929 2.9	1,152 3.9	1,385 4.9	....	....	....	....	....	....	....	....	....	....	....
	Shell	26	4½	7½	293	661	952	1,218	1,416	1,649	....	....	....	....	....	....	....	....	....	....
	Shrapnel	32	4½	7½	297 1	581 1.8	857 2.7	1,140 3.8	1,398 4.9	1,598 6	....	....	....	....	....	....	....	....	....	....
32-pounder of 27 cwt.	Shot	32	4	7	250 .7	545 1.4	800 2.6	1,047 3.7	1,278 4.5	1,469 5.4	1,637 6.3	....	....	....	....	....	....	....	....	....
	Shell	26	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	Shrapnel	32	....	....	250 .7	545 1.4	800 2.6	1,047 3.7	1,278 4.5	1,469 5.4	1,637 6.3	....	....	....	....	....	....	....	....	....
24-pdr. howitzer.	Shell	20	2	....	....	541 2.	760 2.9	960 3.8	1,140 4.3	....	....	....	....	....	....	....	....	....	....	....
	Shrapnel	26	....	....	....	540 1.8	760 2.9	960 4.	1,140 5.	....	....	....	....	....	....	....	....	....	....	....
12-pdr. heavy howitzer.	Shell	10	1	....	....	516 1.9	715 2.8	875 3.6	995 4.3	1,085 5	....	....	....	....	....	....	....	....	....	....
	Shrapnel	13	....	....	....	498 1.8	680 2.6	845 3.7	1,000 4.4	1,150 5.2	....	....	....	....	....	....	....	....	....	....
12-pdr. light howitzer.	Shell	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	Shrapnel	12	625	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

APPENDIX B.—No. VII.—*Approximate ranges of rifle guns.*

Class of gun.	Kind of projectile.	Weight of projectile.	Charge, lbs.	Height above plane.	ELEVATION IN DEGREES—RANGES IN YARDS—TIME OF FLIGHT IN SECONDS.													
					P. B. or 0°.	1°	2°	3°	3½°	3¾°	4°	5°	10°	15°	20°	25°	30°	35°
Parrott—8-inch, or 150 pdr.	Solid shot																	
	Hollow shot																	
	Long shell	155	16									2,100 6¼						
	Short shell																	
Parrott—100 pdr	Solid shot	99¾	No. 7 10									2,200 6¼	3,810 13	5,030 18¼	6,125 22¼	6,910 29		
	Hollow shot	80	10											5,190 19	6,338 23	7,180 29¼	7,988 32¾	8,453 36¾
	Long shell	100	10					1,400 4¼	1,450 4½		1,700 5¼	2,150 6¼	3,700 13	4 790 18	5,853 21¾	6,820 28		
	Short shell	80	10														7,810 32¼	
	Shrapnel																	
Parrott—60 pdr	Shot																	
	Shell																	
	Shrapnel																	
Parrott—30 pdr	Shot																	
	Shell	29	Can. 3¼						1,500 4½			2,200 6¼	3,500 12¼	4,800 17¾	5,700 21¼	6,700 27		
	Shrapnel																	
Parrott—20 pdr	Shot																	
	Shell	18¾	Can. 2							1,500 4¾		2,100 6¼	3,350 11¼	4,400 17¼				
	Shrapnel	19¼	Can. 2			620 1¼	950 3¼											
Dahlgren—20 pdr	Shot		Can. 2															
	Shell	20	2					1,280				1,750						
	Shrapnel		2															
Dahlgren—12 pdr	Shot		Can. 1															
	Shell	12	1								1,400 5							
	Shrapnel		1															

APPENDIX B.—No. VIII.

[*] *Table for Finding the (Distance of an Object at Sea.)*

To use the table let an observer form the cross-trees measure the angle between the distant horizon and the enemy's water-line, and look into the table with that angle; opposite to it, in the column marked distances will be found the distance of the object in yards.

Yards.	Height of the eye above the level of the sea, in feet.								
Distance.	20	30	40	50	60	70	80	90	100
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
100	3.44	5.37	7 29	9.21	11.11	13.00	14.47	16.34	18.16
200	1.50	2.46	3.43	4.39	5.35	6.31	7.27	8.23	9.18
300	1.12	1.49	2.26	3.04	3.41	4.19	4.56	5.33	6.11
400	.52	1.21	1.48	2.16	2.44	3.12	3.40	4.08	4.36
500	.41	1.03	1.25	1.48	2.10	2.32	2.54	3.17	3.39
600	.34	.52	1.10	1.29	1.47	2.05	2.24	2.42	3.01
700	.28	.44	1.01	1.15	1.31	1.46	2.01	2.18	2.34
800	.24	.38	.51	1.05	1.18	1.32	1.46	2.00	2.13
900	.21	.33	.45	.57	1.09	1.22	1.33	1.45	1.57
1000	.18	.29	.40	.50	1.01	1.12	1.23	1.34	1.45
1100	.16	.26	.35	.45	.55	1.05	1.15	1.24	1.34
1200	.15	.23	.32	.41	.50	.59	1.08	1.17	1.26
1300	.13	.21	.29	.37	.45	.53	1.02	1.10	1.18
1400	.12	.19	.27	.34	.41	.49	.57	1.04	1.12
1500	.11	.18	.24	.31	.38	.45	.52	.59	1.07
1600	.10	.16	.22	.29	.35	.42	.48	.55	1.02
1700	.09	.15	.21	.27	.33	.39	45	.51	.58
1800	.08	.14	.19	.25	.31	.36	.42	.48	.54
1900	.08	.13	.18	.23	.29	.34	.39	.45	.50
2000	.07	.12	.17	.22	.27	.32	.37	.42	.47
2100	.06	.11	.16	.20	.25	.30	.35	.40	.45
2200	.06	.10	.15	.19	.24	.28	.33	.38	.42
2300	.05	.10	.14	.18	.22	.27	.31	.36	.40
2400	.05	.09	.13	.17	.21	.25	.29	.34	.38
2500	.05	.08	.12	.16	.20	.24	.28	.32	.36

No correct use of this table can be made when the proximity of land may interfere with the distance of the horizon.

[°] By Lieutenant W. P. Buckner, U. S. N. See a pamphlet "On the Determination of Distances at Sea," by Captain A. P. Ryder, R. N., for more extended tables of this and other methods.

APPENDIX B.—No. IX.

Angles subtended by the mainmasts of British ships-of-war between the water-line and the truck, and also between the water-line and the topmast cross-trees, at distances expressed in yards, the eye of the observer being placed 20 feet above the level of the water. (See Article 278, page 83.)

DISTANCES.	SHIPS OF THE LINE.				FRIGATES.				SLOOPS.		BRIGS.	
	120 Guns. 3 decks.		From 92 to 80 Guns. 2 Decks.		50 Guns.		42 Guns.		26 Guns,		16 Guns.	
	Truck. 208 feet.	Cross-trees. 152 feet.	Truck. 198 feet.	Cross-trees. 144 feet.	Truck. 176 feet.	Cross-trees. 125 feet.	Truck. 168 feet.	Cross-trees. 120 feet.	Truck. 121 feet.	Cross-trees. 85 feet.	Truck. 125 feet.	Cross-trees. 85 feet.
Yards.	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
100	35 53	27 34	34 30	26 16	31 17	23 6	30 4	22 15	22 25	16 2	23 6	16 2
200	19 18	14 19	18 26	13 35	16 29	11 50	15 46	11 22	11 28	8 5	11 50	8 5
300	13 4	9 37	12 27	9 7	11 6	7 55	10 37	7 37	7 40	5 24	7 55	5 24
400	9 52	7 14	9 23	6 51	8 22	5 57	7 59	5 43	5 46	4 3	5 57	4 3
500	7 55	5 47	7 32	5 29	6 42	4 46	6 24	4 35	4 37	3 15	4 46	3 15
600	6 36	4 50	6 17	4 35	5 35	3 58	5 21	3 49	3 51	2 42	3 58	2 42
700	5 40	4 9	5 24	3 56	4 58	3 24	4 35	3 16	3 18	2 19	3 24	2 20
800	4 57	3 38	4 43	3 26	4 12	2 59	4 1	2 52	2 53	2 2	2 59	2 2
900	4 24	3 13	4 12	3 3	3 44	2 39	3 33	2 33	2 34	1 48	2 39	1 48
1000	3 58	2 54	3 57	2 45	3 22	2 23	3 12	2 17	2 19	1 37	2 23	1 37
1100	3 36	2 38	3 26	2 30	3 3	2 10	2 55	2 5	2 6	1 28	2 10	1 28
1200	3 18	2 25	3 9	2 17	2 48	1 59	2 40	1 55	1 56	1 21	1 59	1 21
1300	3 3	2 14	2 54	2 7	2 35	1 50	2 28	1 46	1 47	1 14	1 50	1 14
1400	2 50	2 4	2 42	1 58	2 24	1 42	2 18	1 38	1 39	1 9	1 42	1 10
1500	2 39	1 56	2 31	1 50	2 15	1 35	2 8	1 32	1 32	1 5	1 35	1 5

APPENDIX B.—No. X.

Angles subtended by the mainmasts of French ships-of-war, between the water-line and the truck, and between the water-line and the topmast cross-trees, at distances expressed in yards, the eye of the observer being placed 20 feet above the level of the water.

DISTANCES.	SHIPS OF THE LINE.						FRIGATES.				CORVETTES.		BRIGS.	
	120 GUNS.		90 GUNS.		82 GUNS.		60 GUNS.		44 GUNS.		24 GUNS.		18 GUNS.	
	220 feet. Truck.	158 feet. Cross-trees.	201 feet. Truck.	151 feet. Cross-trees.	192 feet. Truck.	138 feet. Cross-trees.	188 feet. Truck.	139 feet. Cross-trees.	168 feet. Truck.	121 feet. Cross-trees.	120 feet. Truck.	85 feet. Cross-trees.	112 feet. Truck.	77 feet. Cross-trees.
Yards.	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
100	37 30	28 31	34 55	27 24	33 38	24 50	33 4	25 27	30 4	22 25	22 15	16 2	20 52	14 34
200	20 20	14 51	18 41	14 13	17 54	13 2	17 33	13 7	15 46	11 28	11 22	8 5	10 37	7 20
300	13 48	9 59	12 38	9 33	12 5	8 44	11 51	8 48	10 37	7 40	7 37	5 24	7 6	4 54
400	10 25	7 31	9 32	7 11	9 6	6 34	8 55	6 37	7 59	5 46	5 43	4 3	5 20	3 40
500	8 21	6 1	7 39	5 45	7 18	5 16	7 9	5 18	6 24	4 37	4 35	3 15	4 16	2 56
600	6 59	5 1	6 23	4 48	6 5	4 23	5 58	4 25	5 21	3 51	3 49	2 42	3 34	2 27
700	5 59	4 18	5 28	4 7	5 14	3 46	5 6	3 47	4 35	3 18	3 16	2 19	3 3	2 6
800	5 14	3 46	4 48	3 36	4 35	3 18	4 29	3 19	4 1	2 53	2 52	2 2	2 40	1 50
900	4 39	3 21	4 16	3 12	4 4	2 56	3 59	2 57	3 33	2 34	2 33	1 48	2 23	1 38
1000	4 11	3 1	3 50	2 53	3 40	2 38	3 35	2 39	3 12	2 19	2 17	1 37	2 8	1 28
1100	3 49	2 44	3 29	2 37	3 20	2 26	3 16	2 25	2 55	2 6	2 5	1 28	1 57	1 20
1200	3 30	2 31	3 12	2 24	3 3	2 12	2 59	2 13	2 40	1 56	1 55	1 21	1 47	1 14
1300	3 14	2 19	2 57	2 13	2 49	2 2	2 46	2 2	2 28	1 47	1 46	1 14	1 30	1 8
1400	2 60	2 9	2 44	2 4	2 37	1 53	2 34	1 54	2 18	1 39	1 38	1 10	1 32	1 3
1500	2 48	2 1	2 33	1 55	2 27	1 45	2 24	1 46	2 8	1 32	1 32	1 5	1 26	0 59

APPENDIX B.—No. XI.

Tangent practice with 8-inch and 32-pounder guns, with the charge for distant firing. The line of sight is parallel to the axis of the bore. The point supposed to be struck is in the water-line.

Elevation.	Distance.	Height of the parts aimed at above the water.		POINTS AIMED AT.	
				In a French ship of 82 guns.	In a French frigate of 44 guns.
Degr's.	Yards.	Ft.	In.	8-INCH GUN OF 63 CWT.—*1 shell and 9 lbs. powder.*	
Level.	330	9	0	At the upper part of lower ports—gun deck.	Middle of gun deck ports.
1	660	43	7	About half way between rail and fore yard.	About midway between water and main cap.
2	970	108	6	3¼ feet below mizen topmast cross-trees.	Fore topmast cross-trees.
3	1260	207	1	Above main truck.	
				8-INCH GUN OF 55 CWT.—*Charge 7 lbs. 1 shell.*	
Level.	283	7	6	Middle of lower deck ports.	Sills of gun-deck ports.
1	579	37	10	10 feet above hammock rail.	About midway between water and fore cap.
2	689	79	8	Main top.	A little below main cap.
3	1148	188	0	Just below main truck.	Above main truck.
				32-POUNDER OF 57 CWT.—*Charge 9 lbs. 1 shot.*	
Level.	360	9	0	At upper part of lower deck ports.	Middle of gun deck ports.
1	760	48	9	About midway between main cap and water.	Just under fore yard.
2	1150	129	6	3 feet above fore topmast cross-trees.	Main topmast cap.
3	......	....		Above main truck.	
				32-POUNDER OF 27 CWT.—*Charge 4 lbs. 1 shot.*	
Level.	250	7	0	Middle of lower deck ports.	Sills of gun deck ports.
1	545	35	6	About 10 feet above hammock rail	Midway between water and main top.
2	800	90	9	Main cap.	6 feet above main cap.
3	1047	171	6	Head of main top-gallant rigging.	Main truck.

NOTE.—This mode of firing presents serious disadvantages. The points aimed at have often to be estimated, as well as the distance of the enemy's vessel, the class of which can seldom be accurately determined; the men are taught to aim where they are not expected to hit, and the chances of the ricochet are lost; hence tangent firing should only be resorted to when there are no other means of regulating the elevation of the guns. The spars of English ships are rather less than those of French ships of the same class.

REPORT OF TARGET PRACTICE WITH GREAT GUNS ON BOARD
MADE THIS —— DAY OF ——, 18 , AT

Kind of Projectile.	Distance of Target, in yards.	Calibre of Gun.	Class of Gun.	Charge of Powder.	Number of Fires.	Length of Fuse, in seconds of time.	Elevation of Gun, for yards.	FALL OF PROJECTILE.					BURSTING OF SHELLS.			
								No. of Hits	Short of Target	Beyond Target.	Right of Target.	Left of Target.	At or near proper time.	Too soon.	How much too soon.	Not at all.

U. S. S. ______________________ **COMMANDING,**

ARMAMENT ______________________

SHELLS NOT BURST.			No. Fires Direct.	No. Fires Ricochet.	N. B.—Each kind of projectile, distance of target, (measured or estimated,) class of gun, and charge of powder, requires a separate line across the page. REMARKS.
No. Patches of Fuses returned.	Range sufficient to burn Fuses.	Range not sufficient to burn Fuses			

REPORT OF TARGET PRACTICE WITH SMALL-ARMS ON BOARD THE U. S. S. ————————, ———————— COMMANDING, MADE THIS ———— DAY OF ————————, 18 , AT ————————.

KIND OF ARM USED. (Each kind requires a separate line.)	Distance of Target, in yards.	Size of Target, in feet, (say 6 by 1½ feet.)	SINGLE SHOTS WITH DELIBERATE AIM.			VOLLEYS AT ORDER "FIRE."				Whole number of Shots fired.	Kind of Ball used.	Charges of Powder.
			Number Fired.	No. of Hits.	No. within 6 inches of centre of bull's eye.	Number fired	Number shot in each volley.	Number of Hits.	No. within 6 inches of centre of bull's eye.			

REMARKS on each kind of arm used, and the general results of practice; names of those who made the best *average* of shots; Officers whose *divisions* fired best.

16. Is the *whole crew* well trained in the use of small-arms, and in company and battalion drill? If not, state the reasons assigned. State also the condition of the armory, small-arms, and their ammunition.

17. What is the state of the equipment and preparation of boats for armed service? If defective, in what particulars and for what assigned reasons?

18. Times from the call "ARM AND AWAY" to the shoving off of each boat. Time to form a line abreast. Time required for other evolutions. Time required to land small-arm men, from the signal or order given when near the shore. Time to land howitzers, specifying their weights. Time to embark them; to shift from bow to stern. Time to load properly and fire safely three rounds. Are the crews expert in these points?

19. Are the arrangements and apparatus for extinguishing fire efficient? If not, state deficiencies and their causes. Times required to get the several streams of water to the designated point; time required for complete readiness.

20. Have the "Ordnance Instructions" been fully complied with in this ship? State exceptions and reasons assigned, if any.

21. General condition of the vessel in point of armament, carriages, and other ordnance equipments, and of the crew as to efficiency for action, stating particular exceptions, if any, and what remedies have been suggested or applied.

GENERAL ORDER.

NAVY DEPARTMENT, *April* 5, 1861.

Flag Officers are required to hold the semi-annual inspection of each vessel under their command, according to the form given in Appendix C, No. 1, page LXXIV, Ordnance Instructions.

Commanding Officers of vessels acting singly will hold the same general inspection, and, in either case, the reports will be forwarded to the Bureau of Ordnance by the first favorable opportunity after the inspection has taken place.

GIDEON WELLES,
Secretary of the Navy.

APPENDIX C.—No. II

FORM OF REPORTS OF TARGET PRACTICE.

QUESTIONS TO BE ANSWERED AT LENGTH IN THE "REMARKS" ON TARGET PRACTICE, IN ADDITION TO FILLING THE TABLES ON THE NEXT PAGES.

Was the ship at anchor or under way?

Under what sail?

Water rough or smooth?

Force and direction of wind in reference to line of fire?

Roll of the ship, in degrees by pendulum, during firing?

When "carrying sail" by the wind, does heel of ship cause the weather or lee guns to "wood" before they are level?

Was target to windward or to leeward?

How was its distance measured?

Append sketch of target, showing its dimensions, mode of construction and materials, and the "hits" and the fall of projectiles around it.

The degree of strain on breechings of weather batteries?

Were the chocking quoins necessary?

Probable causes of the failure of the shells to burst?

Such other remarks as appear important or suggestive of improvement; such as the best mode of constructing a floating target of 20 by 10 feet, (the size used at the experimental battery, Washington,) etc.

APPENDIX D.

TABLES OF ALLOWANCES OF ORDNANCE EQUIPMENTS AND STORES.

NOTE.—Allowances not proportioned to guns or to ships are proportioned to the complements of Petty Officers, Seamen, Ordinary Seamen, Landsmen, and Boys, and must vary with them. The Armaments are designated by special order of the Bureau of Ordnance.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Howitzers, Equipments, and Implements.																	
AMMUNITION CHESTS	11																
Containing Canister ... No.	27																
" Shell ... No.	18																
" Shrapnel ... No.	54																
BOAT, Pivot Clamps ... No.		One set for each boat carrying a gun.															
" Traverses for Boat Carriages ... sets.																	
" Skids for landing ... sets.																	
" Tracks for Field Carriages ... sets.																	
" Wrenches for Pivot Clamps ... No.																	
BORING BITS ... No.	2																
BOXES, PASSING, 24-pounder ... No.	3																
" " 12-pounder, field ... No.	12																
" for spare articles ... No.	1																
" Caisson, or transporting ... No.	....	Two to each field carriage.															
" Primer ... No.	2																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Howitzers, Equipments, and Implements—Continued.																	
BREECHINGS, for Broadside 24-pounders ... No.	1	If required.															
COVERS, canvas, for howitzers ... No.	1																
CHARGERS for rifle Shells, copper ... No.	1																
CHOCKS, shifting ... No.	1																
COMPRESSERS, spare, for Boat Guns ... No.	1																
DISMOUNTING BARS ... No.	1																
" STRAPS ... No.	1																
DRAG ROPES for Field Guns ... No.	1																
ELEVATING SCREWS, 24-pounder ... No.	2																
" " 12-pounder ... No.	2																
FORMERS for Cartridge Bags ... No.	....	One for each class of howitzers.															
FUNNELS, copper ... No.	1																
FUZE CUTTERS ... No.	11																
" EXTRACTORS, wrench ... No.	1																
" GAUGES for rifle howitzers ... No.	1																
" MALLETS for rifle howitzers ... No.	1																
" PLUG EXTRACTORS for rifle howitzers ... No.	1																
" REAMERS for rifle howitzers ... No.	1																
FUZES, BORMANN'S, spare ... No.	5																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR. Classes. Razees. 1st.	2d.	1st.	2d.	3d.	BRIGS.	STEAMERS. Screw. Classes. 1st.	2d.	3d.	4th.	Side-wheel. Classes. 1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Howitzers, Equipments, and Implements—Continued.																	
HAVERSACKS ... No.	1																
HOWITZER ... No.	....	As may be ordered.															
" Boat Carriage ... No.	1																
" Field Carriage ... No.	1																
LADLES ... No.	1																
LOCKS for Howitzers ... No.	2																
LOCK LANYARDS ... No.	3																
LOCK TOGGLES ... No.	2																
LOOP PINS ... No.	2																
PIVOT BOLTS ... No.	2																
PRIMING WIRES ... No.	2																
PRIMERS for Howitzers ... No.	250																
RAMMERS and SPONGES, connected ... No.	2																
SHIFTING SPAR ... No.	....	One to each class of howitzers.															
SIGHTS for Howitzers, long and short ... No.	2																
SIGHT, Thumb-screws ... No.	2																
SCREW DRIVERS for Fuzes for Rifle Howitzers ... No.	1																
TACKLES for Broadside 24-pounders ... set.	1																
TOMPIONS, with wads and lanyards ... No.	$1\frac{1}{10}$																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS........	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Howitzers, Equipments, and Implements—Continued.																	
TRAIL BARS for Field Howitzers......................No.	1																
TRAIN ROPES for Broadside 24-pounders........ ....No.	3																
VENT GUARDS.................... ....No.	1																
WHEELS, spare, for Field Carriages........... ......No.	1																
SHELLS for Rifle Howitzers..........................No.	90																
SHRAPNEL for Rifle Howitzers........................No.	....																
CANISTER for Rifle Howitzers ....No.	10																
CHARGES for Rifle Howitzers ....No.	100																
JUNK WADS for Rifle Canister........................No.	10																
Articles under proportion to Guns of Battery.																	
APRONS, Brass, for Locks...........................set.	$1\frac{1}{10}$																
" " Breech sights................ ....set.	$1\frac{1}{10}$																
" " Reinforce sights..................set.	$1\frac{1}{10}$																

NOTE.—Each rifle or smooth-bore howitzer used in the ship's battery, and also as a boat and field gun, shall be furnished with fifty per cent. addition to the above ammunition. To each boat armed with a howitzer there shall be furnished one boat chest, one harness cask, one stove, with sand box, pot, frying pan, and four feet of pipe.

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR. Classes. Razees.					BRIGS.	STEAMERS. Screw. Classes.				Side-wheel. Classes.			
					1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Articles under proportion to each Gun—Continued.																		
BEDS	No.	1/5																
BLOCKS, double, spare	No.	1/5																
" single, spare	No.	1/6																
BOLTS, Pivot, for Pivot Guns, spare, bronze	No.																	
" Breeching, spare	No.	1/5																
BORING BITS, Cannon	No.	1/5																
BOXES, Passing, for guns	No.	1 1/10																
" Primer, for gun captains	No.	1	and 2 for pivot guns.															
BREECHINGS, fitted, for friction carriage	No.	1																
" " for truck carriage	No.	2																
BUCKETS, Fire	No.	1	and four for each top.															
" " lanyards	No.	1	and four for each top.															
CANISTER, for each pivot gun	No.	10																
" " broadside gun	No.	5																
CARRIAGES, Gun	No.	1																
" " spare, in parts	No.	....	One for each class of guns on trucks over 32 cwt.															
CHOCKS, Shifting, for Pivot Guns	No.	4																
" Rail " "	No.	2																
" Housing, lower deck	No.	2																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Articles under proportion to each Gun—Continued.																	
COVERS, canvas, for pivot guns. No.	1																
DISMOUNTING APPARATUS, (Griolet) No.	....	One	to	each	gun	dec	k.										
FLASKS, Powder No.	$\frac{1}{4}$																
FUZE PICKERS No.	2																
GRENADES, Hand, 3 pounds No.																	
" " 5 " No.																	
GUNS OF BATTERY No.	....	As	may	be	orde	red.											
GUN SCRAPERS No.	$\frac{1}{10}$																
" " fit on Rammer head No.	....	One	to	each	cali	bre	of	cha	mbe	r.							
HANDSPIKES, Ordinary No.	$2\frac{1}{2}$																
" Roller No.	$1\frac{1}{10}$																
HEAVERS for SELVAGEES set.	1																
IMPRESSION-TAKER for Vents No.	1	For	each	clas	s of	gun											
LADLES, Shot No.	....	One	to	each	cali	bre.											
LANYARDS, Port No.	5	And	one	tric	ing	line	for	port	s re	quir	ing	the	m.				
LANTERNS, Battle, gun decks No.	1																
LASHINGS, Breast No.	1																
" Housing Straps No.	1																
LINCH PINS, Spare No.	$\frac{1}{10}$																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS....................................	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Articles under proportion to each Gun—Continued.																	
LOCKS, Cannon..................................No.	1¼																
" Strings..................................No.	3																
" Toggles..................................No.	2																
" Screws and nuts..........................set.	1¼																
" Blanks, composition......................No.	1¼																
MATCH STAVES...................................No.	$\frac{1}{10}$																
MUZZLE BAGS....................................No.	1																
PINS, for Breeching Shackles, spare............No.	2																
" " Shackles in brackets of Carriages, spare.....No.	2																
PORTFIRE STAVES................................No.	$\frac{1}{10}$																
PRIMERS for CANNON, quill......................No.	....	One hundred and twenty for each 100 rounds.															
" " " friction, (copper)..................No.	50																
" " " " lanyards, complete....No.	2																
" Packing boxes, wood......................No.	..	As many as needed to be accounted for by Gunner.															
" " " tin..................................No.	..																
" " " keys for.............................No.	..																
PRIMING WIRES, Cannon..........................No.	2																
PUNCHES for SHACKLE PINS.......................No.	$\frac{2}{10}$																
QUOINS, Ordinary, for carriages requiring them.......No.	1$\frac{1}{10}$																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS..........	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Articles under proportion to each Gun—Continued.																	
QUOINS, Chocking .... No.	2																
" Transom, for pivot guns .... No.	2																
RAMMERS .... No.	1 2/10																
SABOTS, for Bouched Shells .... No.	....	One	for	each	emp	ty s	hell.										
SCREWS, Compressing, for friction carriages, spare .... No.	1																
" Elevating, for guns needing them .... No.	1 1/10																
SELVAGEES for BREECHINGS .... sets.	1																
SHELLS, in boxes, loaded and fuzed, for shot guns .... No.	25																
" " " " shell guns .... No.	40																
" " " " pivot guns .... No.	80																
" " not loaded or fuzed, for shell guns .. No.	45																
" " " " rifle gans ... No.	100																
" Bearers for pivot gun .... No.	2																
SHOT, Grape, stands for each pivot gun .... No.	10																
" " " broadside gun .... No.	5																
" Cored, xv-inch .... No.	....																
" Solid, for shot guns .... No.	80																
" " for pivot shot guns .... No.	100																
" " ix-inch .... No.	10																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
					Classes.						Screw.				Side-wheel.			
					Razees.						Classes.				Classes.			
					1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Articles under proportion to each Gun—Continued.																		
SHOT, Solid, x-inch	No.	10																
" " xi-inch	No.	10																
" " Rifle	No.	25																
SHRAPNEL, for pivot gun	No.	10																
" " broadside gun	No.	5																
" " Rifle	No.	25																
SIGHTS	sets.	$1\frac{1}{10}$																
" Reinforce	No.	$1\frac{1}{10}$																
" " Bands, Screws	No.	$1\frac{1}{10}$																
" Bolts and Nuts	No.	$1\frac{1}{10}$																
" Screws for Reinforce	No.	$1\frac{1}{10}$																
" Thumb-screws, spare	No.	1																
" Trunnion, for pivot guns	No.	1																
" " Boxes	No.	1																
SPONGES	No.	$1\frac{3}{10}$																
SPONGE CAPS, canvas	No.	$1\frac{3}{20}$																
STRAPS for Bouched Shells	No.	....	One for each empty shell.															
TACKLES, Gun	set.	1																
" " Spare	No.	1																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Articles under proportion to each Gun—Continued.																	
TACKLES, Gun, Pivot, if required ... set.	1																
" Port, lower deck ... No.	2																
THUMB-STALLS ... No.	2	Eight to each reserve box.															
TOMPIONS, with wads and lanyards ... No.	1 $\frac{1}{10}$																
TRUCKS, spare, lignumvitæ ... No.	$\frac{2}{10}$																
TRANSPORTING TRUCKS ... sets.	....	One for each class of guns on friction carriages.															
" AXLES ... No.		"	"	"	"	"	"	"	"	"	"	"					
TUBS, Division ... No.	....	One for each division.															
VENT DRILLS, with braces ... sets.	....	One for each division.															
VENT GUARDS ... No.	1																
VENT PUNCHES ... No.	$\frac{2}{10}$																
WADS, Junk ... No.	10																
" Selvagee ... No.	....	One to each shot and shell. Not to be put *in* box.															
WORMS, Robinson's ... No.	$\frac{2}{10}$																
WRENCHES, Fuze ... No.	$\frac{2}{10}$																
" Screw, patent ... No.	....	Two to each vessel for tightening bolts.															
" Water cap drivers ... No.	$\frac{2}{10}$																

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Small Arms.																	
ARM CHESTS, (not lined,) as required ... No.																	
AXES, Battle, with frogs ... No.	....	170	92	60	54	36	34	20	10	110	63	25	10	60	40	12	10
BELTS, Waist ... No.	....	Sufficient to supply arms furnished.															
CAPS, Percussion, Navy ... No.	....	200 per piece.															
" " Revolver ... No.	....	200 per piece.															
" " Packing boxes, wood ... No. " " " tin ... No. " " " keys for ... No.	..	As many as needed. To be accounted for by gunner.															

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Small Arms—Continued.																	
CARTRIDGE BOXES, Musket, leather ... No.	....	270	120	80	80	70	60	50	20	120	80	50	20	80	70	30	20
" " Carbine or rifle, leather ... No.	....	124	100	80	80	70	60	50	20	100	80	50	20	80	70	30	20
" " Pistol or revolver, leather ... No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" " Revolver, leather ... No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" PAPER, reams ... No.	....	3	2	1	1	1	1	1	½	2	1	1	½	2	1	½	½
CARBINES or **RIFLES** ... No.	....	124	100	80	80	70	60	50	20	100	80	50	20	80	70	30	20
" Ball moulds, if needed ... No.																	
" Bayonets, if needed, with scabbards & frogs. No.	....	124	100	80	80	70	60	50	20	100	80	50	20	80	70	30	20
" Cones ... No.	....	12	10	8	8	7	6	5	2	10	8	5	2	8	7	3	2
" Cone picks ... No.	....	124	100	80	80	70	60	50	20	100	80	50	20	80	70	30	20
" Screwdrivers and Cone keys ... No.	....	12	10	8	8	7	6	5	2	10	8	5	2	8	7	3	2
" Wiper rods ... No.	....	12	10	8	8	7	6	5	2	10	8	5	2	8	7	3	2
" Wipers ... No.																	
CUTLASSES and **SCABBARDS** ... No.	....	290	170	125	110	90	80	60	30	20	130	70	30	110	100	40	30
" Frogs ... No.	....	290	170	125	110	90	80	60	30	20	130	70	30	110	100	40	30
LACQUER, for small arms ... galls.	....	8	6	5	5	5	5	5	2	6	5	5	3	5	5	3	2
" Tin cans for, as required ... No.																	
MUSKETS, Rifled ... No.	....	270	120	80	80	70	60	50	20	120	80	50	20	80	70	30	20
" Ball moulds ... No.	....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
					Classes.						Screw.				Side-wheel.			
					Razees.						Classes.				Classes.			
					1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Small Arms—Continued.																		
MUSKETS, Ball screws and wipers	No.	....	27	12	8	8	7	6	5	2	12	8	5	2	8	7	3	2
" Bands, sets	No.	....	14	6	4	4	3	3	2	1	6	4	3	1	4	3	2	1
" Bayonets, scabbards, and frogs	No.	....	270	120	80	80	70	60	50	20	120	80	50	20	80	70	30	20
" " and scabbards, spare	No.	....	14	6	4	4	3	3	2	1	6	4	3	1	4	3	2	1
" Breech screws	No.	....	7	3	2	2	2	2	2	1	3	2	2	1	2	2	1	1
" Cartridge-formers	sets.	....	2	2	2	2	2	2	2	1	2	2	2	1	2	2	2	1
" Cones	No.	....	27	12	8	8	7	6	5	2	12	8	5	2	8	7	3	2
" " picks	No.	....	270	120	80	80	70	60	50	20	120	80	50	20	80	70	30	20
" Guard screws	No.	....	14	6	4	4	4	3	3	1	6	4	3	1	4	4	2	1
" Hammers	No.	....	14	6	4	4	4	3	3	1	6	4	3	1	4	4	2	1
" Hand vices, spring	No.	....	14	6	4	4	4	3	3	1	6	4	3	1	4	4	2	1
" Locks, complete	No.	....	7	3	2	2	2	2	2	1	3	2	2	1	2	2	1	1
" Lock screws, spare, small	No.	....	75	30	20	20	18	15	13	5	30	20	13	5	20	18	8	5
" Screwdrivers and Cone keys	No.	....	27	12	8	8	7	6	5	2	12	8	5	2	8	7	3	2
" Side screws, spare	No.	....	27	12	8	8	7	6	5	2	12	8	5	2	8	7	3	2
" Springs	sets.	....	14	6	4	4	3	3	2	1	6	4	3	1	4	3	2	1
" Tang screws	No.	....	14	6	4	4	3	3	2	1	6	4	3	1	4	3	2	1
" Triggers	No.	....	7	3	2	2	2	2	2	1	3	2	2	1	2	2	1	1
" Wire and Tumbler punches	No.	....	14	6	4	4	4	3	3	2	6	4	3	2	4	4	2	2

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
					Classes.						Screw.				Side-wheel.			
					Razees.						Classes.				Classes.			
					1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Small Arms—Continued.																		
MUSKETS, Wipers, bristle	No.	....	27	12	8	8	7	6	5	2	12	8	5	2	8	7	3	2
" Worms and Scrapers	No.	....	14	6	4	4	4	3	3	2	6	4	3	2	4	4	2	2
PISTOLS, Navy, or Revolvers	No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" Ball moulds	No.	....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
" Cartridge-formers	No.	....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
" Cones, spare	No.	....	18	11	8	8	6	5	4	2	12	8	4	2	8	6	3	2
" Frogs	No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" Screwdrivers and Cone keys	No.	....	18	11	8	8	6	5	4	2	12	8	4	2	8	6	3	2
" Worms and Scrapers	No.	....	18	11	8	8	6	5	4	2	12	8	4	2	8	6	3	2
" Revolvers	No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" " Bullet moulds	No.	....	2	2	2	2	2	2	2	1	2	2	2	1	2	2	2	1
" " Cone wrenches	No.	....	18	11	8	8	6	5	4	2	12	8	4	2	8	6	3	2
" " Extra bolts	No.	....	18	11	7	7	6	5	4	2	12	8	4	2	7	6	2	2
" " Cones	No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" " Hammers	No.	....	30	20	15	15	10	10	8	5	20	15	10	5	15	10	5	5
" " Hands	No.	....	18	11	7	7	6	5	4	2	12	8	4	2	7	6	2	2
" " Lock screws	No.	....	18	11	7	7	6	5	4	2	12	8	4	2	7	6	2	2
" " Triggers	No.	....	18	11	7	7	6	5	4	2	12	8	4	2	7	6	2	2

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	408	265	235	156	135	97	67	521	333	110	61	224	187	75	50
***Small Arms*—Continued.**																	
PISTOLS, Revolvers, Main and Sear Springs ... No.	....	30	20	15	15	10	10	8	5	20	15	10	5	15	10	5	5
" Flasks ... No.																	
" Frogs ... No.	....	185	110	76	76	60	50	40	20	120	80	40	20	76	60	25	20
" Spring vices ... No.																	
PIKES, Boarding ... No.	....	208	108	80	70	50	45	40	25	126	90	45	25	80	60	30	25
" " guards for ... No.	....	208	108	80	70	50	45	40	25	126	90	45	25	80	60	30	25
SINGLE STICKS ... No.	....	70	60	50	50	40	40	30	20	60	50	40	20	50	40	30	20

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Magazine Stores, &c.																	
ADZES, Copper . . . No.	....	One to each magazine.															
BUCKETS, Water, Copper-bound . . . No.	....	One for each magazine and shell room.															
BRUSHES, Dusting . . . No.	....	Two to each magazine.															
" Paint . . . No.																	
CANS, Water, Copper-bound . . . No.	....	Two to each magazine and one to each shell room.															
CARTRIDGES, Carbine, ball . . . No.	....	100 per piece, 2,00 if breech-loader.															
" Musket, ball . . . No.	....	100 per piece.															
" " blank . . . No.	....	20 per piece.															
" Pistol, ball . . . No.	....	100 per piece.															
" Revolver, ball . . . No.	....	100 per piece.															
" Packing boxes for Carbine . . . No.	..	As required. To be accounted for by gunner.															
" " " Musket . . . No.																	
" " " Rifle . . . No.																	
" " " Pistol . . . No.																	
" " " Revolver . . . No.																	
" " " keys for . . . No.																	
CARTRIDGE BAGS, spare . . . No.	10																
DUST PANS, Copper . . . No.	....	One to each magazine.															

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES	Proportion to each Gun.	Ships-of-the-Line.	Frigates.	Sloops-of-War.					Brigs.	Steamers.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
***Magazine Stores, &c.*—Continued.**																	
FIREWORKS, Costan's Signals, sets*	....	50	20	15	15	10	10	10	10	50	20	10	10	20	15	10	10
" Blue-lights, new pattern, No.	....	50	45	40	40	25	20	15	10	50	40	25	10	40	25	15	20
" Red " ", No.	....	50	45	40	40	25	20	15	10	50	40	25	10	46	25	15	20
" White " ", No.	....	50	45	40	40	25	20	15	10	50	40	25	10	40	25	15	20
" Portfires, No.	....	25	20	15	15	10	5	5	5	25	12	10	5	12	10	5	5
" Rockets and staves, No.	....	100	60	50	50	40	20	20	20	100	50	40	20	50	40	20	20
" Packing boxes for blue, white, & red lights, No.																	
" Packing boxes for Portfires, No.	..	As needed. To be accounted for by gunner.															
" " " Rockets, No.																	
" " " Costan's signals, No.																	
" " " keys for, No.																	
FORMERS, for cutting Cartridge bags, sets.	....	One set to each class of cartridges.															
FUNNELS, for filling Cartridges, No.	....	One to each magazine.															
" " Shells, No.	....	One to each shell room.															
FUZES in metal stocks, 5″, No.	....	One for every four empty shells.															
" " " 10″, No.	....	One for every four empty shells.															
" " " 15″, No.	....	One for every four empty shells.															
" " " 20″, No.	....	One for every four empty shells.															

* Each vessel to be furnished, in addition with ten sets of her own number, with answering and preparatory.

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR. Classes. Razees. 1st.	Razees. 2d.	1st.	2d.	3d.	BRIGS.	STEAMERS. Screw. Classes. 1st.	2d.	3d.	4th.	Side-wheel. Classes. 1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Magazine Stores, &c.—Continued.																	
FUZES, percussion for rifle guns ... No.	....	One for each shell.															
FUZES in paper cases, spare, assorted ... No.	....	One to four shells, put up in shell ac paper, ten in a package.															
" Packing boxes for ... No. " " " keys for ... No.	} ..	As needed.															
" Plug extractor ... No.	....	One to each shell room.															
HOSE, with Pipes ... No.	....	One to each magazine and shell room.															
KNIVES, Copper ... No.	....	One to each magazine.															
LAMP FEEDERS, tin ... No.	....	One to each magazine.															
LANTERNS, Copper, with Lamps ... No.	....	One to each light box.															
" Glass Chimneys for ... No.	....	Six to each lamp requiring them.															
MAGAZINE DRESSES ... suits.	....	10	8	8	8	6	5	4	2	8	6	4	2	8	6	4	2
" SHOES ... pair.	....	10	8	8	8	6	3	4	2	8	6	4	2	8	6	4	2
POWDER, Rounds ...	110	and 65 extra for each Pivot gun.															
" Musket ... lbs.	....	150	100	60	60	50	50	50	50	110	65	50	50	60	50	50	50
" Saluting ...	50	and 730 extra for each flagship. Not to be given to vessels less than ten guns.															
" Shell Charges in Bags ...	....	One for each empty shells															
" Measures, Copper ... sets.	....	One to each magazine and shell room.															
" Whips ... No.	....	As required.															
SCISSORS, Lamp ... No.	....	One pair to each light box.															
SCOOPS, Copper ... No.	Two	to each magazine.															

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE LINE	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Razees		Classes.				Screw. Classes.				Side-wheel. Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
***Magazine Stores, &c.*—Continued.**																	
SCREENS, Baize ... No.	....	Two to each magazine if required.															
SWABS ... No.	....	Two to each magazine if required.															
TANKS, Powder, Copper ... No.	....	Enough to hold *all* powder.															
TANK SCREWS, Spare ... No.	....	One to ten tanks.															
" Wrenches ... No.	....	One to each magazine when necessary.															
" Heavers, Copper ... No.	....	One to each magazine.															
VICES, Copper ... No.	....	One to each vessel.															

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Miscellaneous Articles.																	
AWLS, Saddler's ... No.	....	36	24	18	18	12	12	12	6	24	18	12	6	24	18	12	6
AXES, Wood ... No.	....	6	5	5	5	4	4	3	2	5	5	4	3	5	4	3	2
BANDS, Mast, for fishing spars ... sets.	....	One	set	for	each	lowe	r ma	st an	d bo	wsp	rit.						
BEESWAX ... lbs.	....	One	pou	nd	to	each	gun,	two	to	each	shell	and	pivo	t gu	n.		
BOLTS, Clevis ... No.																	
BOXES, Division, Supply and Reserve ... No.	....	One	of	each	to	each	divi	sion	of	gun	s.						
CALIPERS ... No.																	
CAMPHOR ... lbs.	....	6	5	4	4	3	3	2	1	5	4	2	1	4	3	2	1
CHESTS, Arm, for Boats ... No.	....	One	to	each	lau	nch	and	first	cutt	er.							
CHUTE, Powder ... No.	....	One	to	each	scut	tle.											
DRUMS, Tenor ... No.	....	3	2	2	2	1	1	1	1	2	1	1	1	2	1	1	1
" Bass ... No.	....	1	1	1	1												
DRUMHEADS, Tenor, spare ... No.	....	12	8	8	8	4	4	4	4	8	4	4	4	8	4	4	4
" Bass " ... No.	....	3	3	3	3	....	....	....	....	3	....	....	....	3			
" Snares for spare ... No.	....	4	3	3	3	1	1	1	1	3	1	1	1	3	1	1	1
EMERY ... lbs.	....	6	4	3	3	2	2	2	1	4	3	2	1	4	3	2	1
FIFES ... No.	....	3	2	2	2	2	2	2	1	2	2	2	1	2	2	2	1
FILES, Rattail, for Spikes for Howitzers ... No.	2																
FLASH PANS, Copper ... No.	....	2	2	2	2	2	1	1	1	2	2	1	1	2	2	1	1

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Miscellaneous Articles—Continued.																	
GLASS, thick plates ... No.	....	Half set to each battle lantern, cut to fit.															
GONGS ... No.	....	One to each gun deck.															
GRAPNELS, two for each Boat ... No.																	
GRUBBING HOE and PICKAXE, combined ... No.	....	One to each field carriage.															
HAMMERS, Claw ... No.	....	2	2	2	2	2	2	2	1	2	2	2	1	2	2	1	1
" Saddler's ... No.	....	2	2	2	2	2	2	2	1	2	2	2	1	2	2	1	1
KNIVES, Shoe ... No.	....	3	2	2	2	2	2	2	2	2	2	2	1	2	2	2	1
LADLES, Shot, great guns ... No.	....	One to each calibre.															
LANTERNS, Dark ... No.	$\frac{1}{10}$																
LEAD, Black, pulverized ... lbs.	....	21	12	6	6	6	5	4	3	12	6	5	3	6	5	4	3
LOCK STRINGS, spare ... faths.	3																
LOCKS, PAD, Brass, and Keys ... No.	....	Two to each magazine and light box scuttle.															
MATCH ROPE ... lbs.	....	50	40	30	30	25	25	20	10	40	30	20	10	40	30	20	10
MUSLIN for TARGETS ... yds.	....	50	50	50	50	40	40	40	20	50	50	40	20	50	50	40	20
OIL, Sperm, Small Arms ... galls.	....	10	8	6	6	5	5	5	3	8	6	5	3	6	5	3	3
" " Tin Cans for ... No.	....	As needed.															
NAILS, third, for strapping shell ... lbs.	....	10	5	3	3	2	2	2	1	5	3	2	1	5	3	2	1

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES.	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS	....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Miscellaneous Articles—Continued.																	
PENDULUM ... No.																	
PUTTY, in Bladders ... lbs.	....	100	75	50	50	45	45	40	20	75	50	40	20	50	40	20	20
QUADRANT, GUNNERS' ... No.																	
RATTLES for calling Boarders, Hand ... No.	$\frac{3}{10}$																
" " " Fixed ... No.	....	One at wheel and one on each gun deck.															
ROPE, Hemp, 3-inch, for Boats ... faths.																	
SCREWDRIVERS ... No.																	
SCREW PLATE and TAP, fuze, Navy ... No.	....	One set for each vessel armed with shell guns.															
" " " " Parrott ... No.	....	One set for each vessel armed with these guns.															
SHEARS, Sheep ... No.	....	One pair to each vessel.															
SHELL WHIPS ... No.	....	As required.															
SHOVELS, Entrenching ... No.	....	Two for each field carriage.															
SIGNAL-LIGHT DISCHARGERS ... No.	....	One for each vessel.															
SKINS, Sheep, (cover for sponge heads, made up) ... No.	1½																
SLINGS, Gun, chain ... No.	....	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1
TACKS, Copper, for sponge heads ... No.	....	1000	500	300	300	200	200	200	100	500	300	200	100	500	300	200	100
" Iron, for strapping shell ... No.	....	4000	2000	1200	1200	1000	1000	1000	600	2000	1200	1000	600	2000	1200	1000	600
TARGET FRAME ... No.	....	One to each vessel; to be fitted on board.															

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES	Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
				Classes.						Screw.				Side-wheel.			
				Razees.						Classes.				Classes.			
				1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th
COMPLEMENTS	...	721	402	265	235	156	132	97	67	521	322	110	61	221	187	75	70
***Miscellaneous Articles*—Continued.**																	
THREAD, Shoe lbs.	....	3	2	1	1	1	1	1	½	2	1	1	½	2	1	1	1½
TONGS, Shot No.	....	As required.															
TUBS, Fire No.	....	One to each chain of scuttles.															
WAX, for taking Vent Impressions lbs.																	
WICKS, Woven gross.	....	One half to each lamp requiring them.															
" Cotton lbs.																	
YARN, Worsted lbs.	....	2	1	1	1	½	½	½	½	1	1	½	½	1	1	½	½
" Coarse woollen, ("Thrums") lbs.	....	2	1	1	1	½	½	½	½	1	1	½	½	1	1	½	½
21-thd. **HEMP**, Boat's service lbs.																	
18-thd. " " lbs.																	

Tables of Allowances of Ordnance Equipments and Stores—Continued.

NAMES OF ARTICLES		Proportion to each Gun.	SHIPS-OF-THE-LINE.	FRIGATES.	SLOOPS-OF-WAR.					BRIGS.	STEAMERS.							
					Classes.						Screw.				Side-wheel.			
					Razees.						Classes.				Classes.			
					1st.	2d.	1st.	2d.	3d.		1st.	2d.	3d.	4th.	1st.	2d.	3d.	4th.
COMPLEMENTS		....	721	402	265	235	156	135	97	67	521	333	110	61	224	187	75	50
Books.																		
BLANK BOOKS AND RETURNS	sets.	....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
BOAT ARMAMENT, System of	No.																	
BORMANN ON SHRAPNEL	No.																	
CIRCULARS	set.																	
EXPERIMENTS ON STRENGTH OF GUNS	No.																	
" " GUNPOWDER	No.																	
NAVAL LIGHT ARTILLERY	No.																	
NAVAL GUNNERY, Sir H. Douglass's	No.																	
" " Ward's	No.																	
" " Simpson's	No.																	
ORDNANCE INSTRUCTIONS	No.	....	One to each division officer. To be accounted for and returned.															
" MEMORANDA	No.																	
RULES FOR CLEANING MUSKETS	No.																	
RIFLED FIELD PIECES	No.																	
SMALL ARMS AND ARTILLERY EXERCISE	No.																	

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